

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

FRACTUS, S.A.,	§	
	§	
Plaintiff,	§	<b>CIVIL ACTION NO. 2:18-CV-00135-JRG</b>
	§	<b>LEAD CASE</b>
v.	§	
	§	
AT&T MOBILITY LLC,	§	
	§	
<hr/>		
SPRINT COMMUNICATIONS	§	<b>CIVIL ACTION NO. 2:18-CV-00136-JRG</b>
COMPANY, L.P., SPRINT SPECTRUM,	§	<b>MEMBER CASE</b>
L.P., SPRINT SOLUTIONS, INC., NEXTEL	§	
OPERATIONS, INC.,	§	
	§	
<hr/>		
T-MOBILE US, INC., T-MOBILE USA,	§	<b>CIVIL ACTION NO. 2:18-CV-00137-JRG</b>
INC.,	§	<b>MEMBER CASE</b>
	§	
	§	
<hr/>		
VERIZON COMMUNICATIONS INC.,	§	<b>CIVIL ACTION NO. 2:18-CV-00138-JRG</b>
CELLCO PARTNERSHIP D/B/A VERIZON	§	<b>MEMBER CASE</b>
WIRELESS,	§	
	§	
Defendants.	§	

**CLAIM CONSTRUCTION MEMORANDUM AND ORDER**

Before the Court is the Opening Claim Construction Brief (Dkt. No. 183) filed by Plaintiff Fractus, S.A. (“Plaintiff” or “Fractus”). Also before the Court are the Responsive Claim Construction Brief (Dkt. No. 211) filed by Defendants AT&T Mobility LLC, Sprint Communications Company, L.P., Sprint Spectrum L.P., Sprint Solutions, Inc., Nextel Operations, Inc., Cellco Partnership d/b/a Verizon Wireless, T-Mobile USA, Inc., and T-Mobile US, Inc., and Intervenor-Defendants CommScope Technologies LLC and CellMax Technologies, AB (collectively, “Defendants”) as well as Plaintiff’s reply (Dkt. No. 218).

The Court held a claim construction hearing on March 25, 2019.

## Table of Contents

<b>I. BACKGROUND.....</b>	<b>3</b>
<b>II. LEGAL PRINCIPLES .....</b>	<b>3</b>
<b>III. AGREED TERMS.....</b>	<b>8</b>
<b>IV. DISPUTED TERMS IN THE INTERLACED PATENTS.....</b>	<b>12</b>
A. “antenna element” and “element” .....	12
B. “juxtaposition” .....	15
C. “multiband antenna,” “multiband antenna element,” and “multiband antenna array” .....	25
D. “interlaced multiband antenna array” .....	31
E. “frequency band” .....	35
F. “situated around” .....	41
G. “at least one . . . antenna element of . . . antenna array(s) . . . is repositioned to coincide with a nearest . . . antenna element of . . . antenna array(s)” .....	47
H. “radiation and impedance patterns that are [substantially] similar in a plurality of the plurality of working frequency bands” .....	51
I. antenna array “employing a . . . multiband antenna in those positions of the [array] in which the positions of two or more elements . . . come together” .....	59
<b>V. DISPUTED TERMS IN THE SLIM TRIPLE BAND PATENTS .....</b>	<b>66</b>
<b>VI. CONCLUSION .....</b>	<b>67</b>

## I. BACKGROUND

Plaintiff has alleged infringement of: United States Patents No. 6,937,191 (“the ’191 Patent”), 7,250,918 (“the ’918 Patent”), 7,557,768 (“the ’768 Patent”), 7,932,870 (“the ’870 Patent”), and 8,228,256 (“the ’256 Patent”) (collectively, “the Interlaced Patents”); and United States Patents No. 8,497,814 (“the ’814 Patent”) and 9,450,305 (“the ’305 Patent”) (collectively, “the Slim Triple Band Patents”)<sup>1</sup> (all, collectively, “the patents-in-suit”). (See Dkt. No. 1, Exs. A–J.) The ’191 Patent, titled “Interlaced Multiband Antenna Arrays,” issued on August 30, 2005, and bears an earliest priority date of October 26, 1999. The Abstract of the ’191 Patent states:

Antenna arrays which can work simultaneously in various frequency bands thanks to the physical disposition of the elements which constitute them, and also the multiband behaviour of some elements situated strategically in the array. The configuration of the array is described based on the juxtaposition or interleaving of various conventional mono-band arrays working in the different bands of interest. In those positions in which elements of different multiband arrays come together, a multiband antenna is employed which covers the different working frequency bands. The advantages with respect to the classic configuration of using one array for each frequency band are: saving in cost of the global radiating system and its installation (one array replaces several), and its size and visual and environmental impact are reduced in the case of base stations and repeater stations for communication systems.

## II. LEGAL PRINCIPLES

It is understood that “[a] claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention.” *Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1340 (Fed. Cir. 1999). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (en banc), *aff’d*, 517 U.S. 370 (1996).

---

<sup>1</sup> Plaintiff no longer asserts the Slim Triple Band patents. (See Dkt. No. 217, at 2.)

“In some cases, however, the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.” *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015) (citation omitted). “In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the ‘evidentiary underpinnings’ of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.” *Id.* (citing 517 U.S. 370).

To ascertain the meaning of claims, courts look to three primary sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. The specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. *Id.* A patent’s claims must be read in view of the specification, of which they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. *Id.* “One purpose for examining the specification is to determine if the patentee has limited the scope of the claims.” *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee’s invention. Otherwise, there would be no need for claims. *SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1388 (Fed. Cir. 1992). Although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim

language is broader than the embodiments. *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

This Court’s claim construction analysis is substantially guided by the Federal Circuit’s decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that “the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id.* The ordinary and customary meaning of a claim term “is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1313. This principle of patent law flows naturally from the recognition that inventors are usually persons who are skilled in the field of the invention and that patents are addressed to, and intended to be read by, others skilled in the particular art. *Id.*

Despite the importance of claim terms, *Phillips* made clear that “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.* Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of “a fully integrated written instrument.” *Id.* at 1315 (quoting *Markman*, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id.* at 1314–17. As the Supreme Court stated long ago, “in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the

language employed in the claims.” *Bates v. Coe*, 98 U.S. 31, 38 (1878). In addressing the role of the specification, the *Phillips* court quoted with approval its earlier observations from *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998):

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.

*Phillips*, 415 F.3d at 1316. Consequently, *Phillips* emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. Like the specification, the prosecution history helps to demonstrate how the inventor and the United States Patent and Trademark Office (“PTO”) understood the patent. *Id.* at 1317. Because the file history, however, “represents an ongoing negotiation between the PTO and the applicant,” it may lack the clarity of the specification and thus be less useful in claim construction proceedings. *Id.* Nevertheless, the prosecution history is intrinsic evidence that is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims. *Id.*; see *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (noting that “a patentee’s statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation”).

*Phillips* rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes.

*Phillips*, 415 F.3d at 1319–24. According to *Phillips*, reliance on dictionary definitions at the expense of the specification had the effect of “focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent.” *Id.* at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id.*

*Phillips* does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id.* at 1323–25. Rather, *Phillips* held that a court must attach the appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant.

The Supreme Court of the United States has “read [35 U.S.C.] § 112, ¶ 2 to require that a patent’s claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910, 134 S. Ct. 2120, 2129 (2014). “A determination of claim indefiniteness is a legal conclusion that is drawn from the court’s performance of its duty as the construer of patent claims.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus*, 134 S. Ct. 2120. “Indefiniteness must be proven by clear and convincing evidence.” *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

### III. AGREED TERMS

The parties have submitted the following agreed-upon constructions (Dkt. No. 132, Ex. A; Dkt. No. 238-1, Ex. A, at 4–5, 9, 10, 17, 23, 30, 31, 36–37 & 43), which the Court adopts:

<u>Term</u>	<u>Construction</u>
integer divider  '870 Patent, Claim 1 '768 Patent, Claims 9, 14, 21	“a divider that is a whole number, and does not have a fractional or decimal part”
integer factor  '918 Patent, Claim 25 '940 Patent, Claim 16	“a factor that is a whole number, and does not have a fractional or decimal part”
come together  '191 Patent, Claims 1, 5 '918 Patent, Claims 1, 5 '768 Patent, Claims 1, 9, 16, 23, 30, 38 '870 Patent, Claims 1, 4, 11, 20, 29 '256 Patent, Claims 1, 17	“coincide in the same physical location”
interlaced dual-polarized multiband antenna array  '870 Patent, Claims 29, 33–38	The term “interlaced dual-polarized multiband antenna array” should be construed as “an interlaced multiband antenna array having dual polarization,” with “interlaced multiband antenna array” being separately construed.
repositioned  '768 Patent, Claims 17, 31 '870 Patent, Claim 1 '256 Patent, Claim 11	“moved to a different position”
two, three, or more cellular or wireless services  '814 Patent, Claim 4	“two or more cellular or wireless services”



<p>the number of the mono-band arrays corresponds to the number of working frequencies of the multiband antenna array</p> <p>'191 Patent, Claims 1, 5</p>	<p>“the number of the mono-band antenna arrays equals the number of working frequencies of the multiband antenna array”</p>
<p>the number of the plurality of mono-band antenna arrays corresponds to the number of working frequency bands of the interlaced multiband antenna array</p> <p>'918 Patent, Claim 1</p>	<p>“the number of the plurality of mono-band antenna arrays equals the number of working frequency bands of the interlaced multiband antenna array”</p>
<p>a number of the plurality of mono-band antenna arrays corresponds to a number of the plurality of working frequency bands of the interlaced multiband antenna array</p> <p>'768 Patent, Claims 1, 9, 16, 23, 30, 38 '870 Patent, Claims 1, 11, 20</p>	<p>“the number of the plurality of mono-band antenna arrays equals the number of the plurality of working frequency bands of the interlaced multiband antenna array”</p>
<p>a number of the plurality of dual-polarized mono-band antenna arrays corresponds to a number of the plurality of working frequency bands of the interlaced dual-polarized multiband antenna array</p> <p>'870 Patent, Claim 29</p>	<p>“the number of the plurality of dual-polarized mono-band antenna arrays equals the number of the plurality of working frequency bands of the interlaced dual-polarized multiband antenna array”</p>
<p>a first plurality of antenna elements operating in . . .</p> <p>'493 Patent, Claim 1</p>	<p>“a first plurality of antenna elements, each antenna element operating in . . .”</p>
<p>a first set of antenna elements transmitting and receiving . . .</p> <p>'493 Patent, Claim 11</p>	<p>“a first set of antenna elements, each antenna element transmitting and receiving . . .”</p>
<p>a second set of antenna elements transmitting and receiving . . .</p> <p>'493 Patent, Claim 11</p>	<p>“a second set of antenna elements, each antenna element transmitting and receiving . . .”</p>

a set of antenna elements operating in . . .  '493 Patent, Claim 18	“a set of antenna elements, each antenna element operating in . . .”
a first plurality of antenna elements . . . being configured to provide operation . . .  '940 Patent, Claim 8	“a first plurality of antenna elements . . ., each antenna element being configured to provide operation . . .”
a second plurality of antenna elements . . . being configured to provide operation . . .  '940 Patent, Claim 8	“a second plurality of antenna elements . . ., each antenna element being configured to provide operation . . .”
antenna array  '256 Patent, Claims 1, 11, 17 '940 Patent, Claims 8, 9 '814 Patent, Claims 1, 8–11, 15, 17–21 '305 Patent, All Asserted Claims	“two or more antenna elements arranged and excited in order to shape the radiation pattern”
array  '191 Patent, Claims 1, 5	“two or more antenna elements arranged and excited in order to shape the radiation pattern”
a first set of radiating elements for operating at at least said first frequency band  '814 Patent, Claim 1	“a first set of radiating elements, each radiating element for operating at at least said first frequency band”
a second set of radiating elements for operating at at least said second frequency band  '814 Patent, Claim 1	“a second set of radiating elements, each radiating element for operating at at least said second frequency band”
a third set of radiating elements for operating at only both of said third frequency band and said first frequency band  '814 Patent, Claim 1	“a third set of radiating elements, each radiating element operating at only both of said third frequency band and said first frequency band”

a fourth set of radiating elements for operating at only at both of said third frequency band and said second frequency band  '814 Patent, Claim 1	"a fourth set of radiating elements, each radiating element operating at only both of said third frequency band and said second frequency band"
smaller than 0.5, 0.4, 0.35, or even 0.3 times a wavelength  '814 Patent, Claim 5	"smaller than 0.5 times a wavelength"
smaller than 0.5, 0.45, 0.4, 0.35, or even 0.3 times a wavelength  '814 Patent, Claim 6	"smaller than 0.5 times a wavelength"
smaller than 1, 0.9 or 0.8 times a wavelength  '814 Patent, Claim 9	"smaller than 1 times a wavelength"
less than 0.5, 0.4 or even 0.3 times the wavelength  '814 Patent, Claim 18	"less than 0.5 times a wavelength"
less than 2, 1.5, 1.4, 1.3, or even 1 times a wavelength  '814 Patent, Claim 18	"less than 2 times a wavelength"
a third set of radiating elements, wherein a plurality of radiating elements of the third set are configured to operate at the first frequency band and a third frequency band  '305 Patent, Claim 1	"a third set of radiating elements, wherein each of a plurality of radiating elements of the third set are configured to operate at the first frequency band and a third frequency band"
a third set of radiating elements configured to operate at the first frequency band and a third frequency band  '305 Patent, Claim 12	"a third set of radiating elements, each element configured to operate at the first frequency band and a third frequency band"

#### IV. DISPUTED TERMS IN THE INTERLACED PATENTS

##### A. “antenna element” and “element”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“individual antenna that makes up an array”	“individual antenna that makes up an antenna array and that can independently radiate and receive electromagnetic waves”

(Dkt. No. 132, Ex. B, at 2 & 4; Dkt. No. 183, at 3; Dkt. No. 238-1, Ex. A, at 1, 6, 12, 24, 30 & 37.)

The parties submit that “antenna element” appears in Claim 1 of the ’191 Patent, Claims 1, 5, 23, and 26 of the ’918 Patent, Claims 1, 8, 9, 12, 16, 17, 23, 30, 31, and 38 of the ’768 Patent, Claims 1, 4, 11, 20, and 29 of the ’870 Patent, Claims 1, 6, 7, 11, and 17 of the ’256 Patent, Claims 1, 9, 11, 13, 14, and 18 of the ’493 Patent, and Claims 8, 9, 11, and 18 of the ’940 Patent. (Dkt. No. 132, Ex. B, at 2.) The parties submit that “element” appears in Claims 1 and 5 of the ’191 Patent and Claim 17 of the ’256 Patent. (Dkt. No. 132, Ex. B, at 4.)

##### (1) The Parties’ Positions

Plaintiff argues that Defendants’ proposal should be rejected because “[n]owhere does the specification or claims discuss the ‘independent’ radiation and reception of electromagnetic waves or any related concept.” (Dkt. No. 183, at 3.)

Defendants respond that “Fractus cannot dispute that an ‘antenna element’ must radiate and receive electromagnetic waves.” (Dkt. No. 211, at 1.) In particular, Defendants argue that an individual antenna element must itself be able to radiate and receive radio waves. (*Id.*, at 2.) Defendants urge that “Defendants’ construction makes clear that two separate, independently radiating elements centered at the same location are not a single ‘antenna element.’” (*Id.*, at 3.)

Plaintiff replies that “Defendants’ position is based on a misreading of statements made during the European and U.S. prosecutions, and confuses distinctions Fractus drew between the

term ‘*multiband* antenna element’ and prior art in which two independent antennas were located in the same position—not distinctions based on the standalone term ‘antenna element.’” (Dkt. No. 218, at 1.)

(2) Analysis

Claim 1 of the ’191 Patent, for example, recites (emphasis added):

1. An interlaced multiband antenna array having a plurality of *antenna elements*, wherein the multiband antenna array works simultaneously on a plurality of frequencies,

the multiband antenna array being characterised in that the position of the *elements* in the array results from the juxtaposition of a plurality of mono-band arrays, wherein the number of mono-band arrays corresponds to the number of working frequencies of the multiband antenna array,

the multiband antenna array employing a single multiband antenna in those positions of the multiband antenna array in which the positions of two or more *elements* of the mono-band arrays come together, wherein the single multiband antenna covers at least two working frequencies of the multiband antenna array.

As to the term “antenna element,” at the March 25, 2019 hearing Plaintiff agreed that an antenna can receive and transmit radio signals. (*See also* Dkt. No. 183, at 1 (“Base station antennas enable communication between the cellular telephone network and mobile devices like cell phones, and are comprised of individual antenna elements that work together in an array to provide reception and transmission of radio signals.”).) The specification discloses that “antenna array theory” “establishes the basic design rules for shaping the radiation properties of the array.” ’191 Patent at 1:56–61.

Defendants have submitted a technical dictionary definition of “antenna” as: “That part of a transmitting or receiving system that is designed to radiate or to receive electromagnetic waves.” (Dkt. No. 211, Ex. 9, *IEEE Standard Definitions of Terms for Antennas* § 2.12 (1993); *see id.* at § 2.306 (defining “radiating element” as: “A basic subdivision of an antenna that in itself is capable

of radiating or receiving radio waves.”); *see also id.*, Ex. 10, *The Authoritative Dictionary of IEEE Standards Terms* (7th ed. 2000) (same as to “antenna” and “radiating element”).<sup>2</sup>

“Because dictionaries, and especially technical dictionaries, endeavor to collect the accepted meanings of terms used in various fields of science and technology, those resources have been properly recognized as among the many tools that can assist the court in determining the meaning of particular terminology to those of skill in the art of the invention.” *Phillips*, 415 F.3d at 1318).

As to the term “element,” although the parties have proposed that “element” has the same meaning as “antenna element,” the patents-in-suit use “element” in various contexts, not just in the context of a particular antenna. For example, the specification refers not only to elements of an array but also elements of an individual multiband antenna. *See, e.g.*, ’191 Patent at 2:33–39 (“antenna formed by a set of elements”), 2:58–3:6 (“disposition of the elements that constitute the MIA [(Multiband Interleaved Array)]”) & 3:7–8 (“each element of the array”). The term “element” requires no construction apart from the Court’s constructions of larger terms.

The Court thus hereby construes these disputed terms as set forth in the following chart:

<u>Term</u>	<u>Construction</u>
<b>“antenna element”</b>	<b>“individual antenna that makes up an antenna array and that by itself can radiate and receive radio waves”</b>
<b>“element”</b>	<b>Plain meaning</b>

---

<sup>2</sup> Defendants have also cited the patentee’s statements in European patent proceedings, for example that the phrase “independent antenna” refers to “an element that by itself can transmit or receive electromagnetic waves,” but these foreign proceedings do not significantly affect the Court’s analysis here. (*See* Dkt. No. 211, Ex. 7, Nov. 2, 2004 Letter, at 2–3.)

**B. “juxtaposition”**

<p style="text-align: center;"><b>“juxtaposition”</b> (’918 Patent, Claim 1; ’870 Patent, Claim 29)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“overlapping [a plurality of mono-band antenna arrays] to determine the position where antenna elements in the mono-band antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”	The term does not need to be construed separately and should be construed as part of the larger phrases discussed below.
<p style="text-align: center;"><b>“juxtaposition of a plurality of mono-band antenna arrays”</b> (’918 Patent, Claim 1; ’768 Patent, Claims 1, 9, 16, 23, 30, 38; ’870 Patent, Claims 1, 11, 20)</p> <p style="text-align: center;"><b>“juxtaposition of a plurality of mono-band arrays”</b> (’191 Patent, Claims 1, 5)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“overlapping a plurality of mono-band antenna arrays to determine the position where antenna elements in the mono-band antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”	“interleaving the antenna elements of a plurality of mono-band antenna arrays while maintaining the spacing between the antenna elements within each mono-band array”

<p><b>“juxtaposition of at least a first antenna array operating in a first frequency band, and a second antenna array operating in a second frequency band”</b>  ('256 Patent, Claims 1, 17)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“overlapping at least a first antenna array operating in a first frequency band, and a second antenna array operating in a second frequency band to determine the position where antenna elements in the mono-band antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”	“interleaving the antenna elements of a first antenna array operating in a first frequency band and the antenna elements of a second antenna array operating in a second frequency band while maintaining the spacing between the antenna elements within the first antenna array and the antenna elements within the second antenna array”
<p><b>“positions of the plurality of antenna elements result from juxtaposition of a plurality of mono-band antenna arrays”</b>  ('918 Patent, Claim 1; '768 Patent, Claims 1, 9, 16, 23, 30, 38; '870 Patent, Claims 1, 11, 20)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“positions of the plurality of antenna elements result from overlapping a plurality of mono-band antenna arrays to determine the position where antenna elements in the mono-band antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”	“positions of the plurality of antenna elements in the interlaced multiband antenna array result from the step of interleaving the antenna elements of the plurality of mono-band antenna arrays while maintaining the spacing between the antenna elements within each mono-band array” (this is a product-by-process limitation)



<p><b>“the position of the elements in the array results from the juxtaposition of a plurality of mono-band arrays”</b> (’191 Patent, Claims 1, 5)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>“the position of the elements in the array results from overlapping a plurality of mono-band antenna arrays to determine the position where antenna elements in the mono-band antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”</p>	<p>“positions of the antenna elements in the interlaced multiband antenna array result from the step of interleaving the antenna elements of a plurality of mono-band antenna arrays while maintaining the spacing between the antenna elements with each mono-band array” (this is a product-by-process limitation)</p>
<p><b>“positions of the plurality of antenna elements result from juxtaposition of at least a first antenna array operating in a first frequency band, and a second antenna array operating in a second frequency band, and a third antenna array operating in a third frequency band”</b> (’256 Patent, Claim 17)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>“positions of the plurality of antenna elements result from overlapping at least a first antenna array operating in a first frequency band, and a second antenna array operating in a second frequency band, and a third antenna array operating in a third frequency band, to determine the position where antenna elements in the antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”</p>	<p>“positions of the antenna elements in the interlaced multiband antenna array result from the step of interleaving the antenna elements of a first antenna array operating only in a first frequency band, the antenna elements of a second antenna array operating only in a second frequency band, and the antenna elements of a third antenna array operating only in a third frequency band while maintaining the spacing between the antenna elements within the first antenna array, the second antenna array, and the third antenna array” (this is a product-by-process limitation)</p>

<p><b>“positions of the plurality of dual-polarized antenna elements result from juxtaposition of a plurality of dual-polarized mono-band antenna arrays”</b> (’870 Patent, Claim 29)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“positions of the plurality of dual-polarized antenna elements result from overlapping a plurality of dual-polarized mono-band antenna arrays to determine the position where antenna elements in the antenna arrays coincide (including after repositioning elements in low-frequency mono-band array[s] to the positions of elements in the highest-frequency array)”	“positions of the dual-polarized antenna elements in the interlaced multiband antenna array result from the step of interleaving the dual-polarized antenna elements of the plurality of dual polarized mono-band antenna arrays while maintaining the spacing between the dual-polarized antenna elements within in each dual-polarized mono-band array” (this is a product-by-process limitation)

(Dkt. No. 132, Ex. B, at 14; Dkt. No. 183, at 4–6; Dkt. No. 238-1, Ex. A, at 2–3, 6–8, 12–14, 18–19, 24–26, 32–33 & 37–39; *see id.* at 34.)

#### (1) The Parties’ Positions

Plaintiff submits that “juxtapositioning” “instructs that the multiband element’s placement should be determined after repositioning elements in the lower-frequency mono-band array to the positions of elements in the highest-frequency array.” (Dkt. No. 183, at 6.) Plaintiff argues that “[j]uxtaposition’ is not a process for manufacturing an antenna array, but a descriptive tool that defines the placement of the elements,” and “[t]he claims explicitly define the relevant limitation as describing the *positions* of the elements, *not* as reciting a process that results in the claimed product.” (*Id.*, at 8 & 10.) Plaintiff explains that “[o]nce the positioning of the elements is determined by the antenna engineer, the antennas are manufactured without any reference to juxtapositioning at all.” (*Id.*, at 10.) Finally, Plaintiff argues that Defendants’ proposed interpretation “not only reads the repositioning aspect out of the term ‘juxtapositioning,’ but also *excludes* any configurations requiring repositioning.” (*Id.*, at 11.)

Defendants respond that Plaintiff's proposal of "overlapping" is unclear and lacks support in the specification. (Dkt. No. 211, at 15.) Defendants also argue that "[e]very example of a multiband antenna array in the patents that was formed by 'juxtaposing' two or more monoband arrays maintains the original spacing of the constituent mono-band array elements," and "the specification treats 'juxtaposition' and 'repositioning' as separate steps (with repositioning occurring, if at all, *after* juxtaposition)." (*Id.*, at 16–17.) Finally, Defendants argue that "[t]he claims here require that the positions of the elements in the antenna array *result from* a specific process: juxtaposing (interleaving) two or more monoband antenna arrays." (*Id.*)

Plaintiff replies that "[j]uxtaposition is the term used throughout the specification and claims to describe the position of elements in the claimed multiband array by reference to the positioning of elements in conventional monoband arrays." (Dkt. No. 218, at 2.)

## (2) Analysis

Claim 1 of the '191 Patent, for example, recites (emphasis added):

1. An interlaced multiband antenna array having a plurality of antenna elements, wherein the multiband antenna array works simultaneously on a plurality of frequencies,

the multiband antenna array being characterised in that the position of the elements in the array results from the *juxtaposition* of a plurality of mono-band arrays, wherein the number of mono-band arrays corresponds to the number of working frequencies of the multiband antenna array,

the multiband antenna array employing a single multiband antenna in those positions of the multiband antenna array in which the positions of two or more elements of the mono-band arrays come together, wherein the single multiband antenna covers at least two working frequencies of the multiband antenna array.

As another example, Claim 1 of the '918 Patent recites (emphasis added):

1. An interlaced multiband antenna array comprising:

a plurality of antenna elements;

wherein the interlaced multiband antenna array is adapted to operate simultaneously on a plurality of frequency bands;

wherein positions of the plurality of antenna elements result from *juxtaposition* of a plurality of mono-band antenna arrays;

wherein the number of the plurality of mono-band antenna arrays corresponds to the number of working frequency bands of the interlaced multiband antenna array;

wherein the interlaced multiband antenna array employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together; and

wherein the single multiband antenna element covers at least two working frequency bands of the interlaced multiband antenna array.

Plaintiff has not shown that the term “juxtaposition” has any well-known meaning in the relevant art. The specification refers to “juxtaposition or interleaving”:

The array configuration is described on a basis of the *juxtaposition or interleaving* of various conventional single-band arrays operating in the different bands of interest. In those positions where elements of different multiband arrays come together, use is made of a multiband antenna which covers the different working frequency bands.

\* \* \*

A Multiband *Interleaved* Array (MIA) consists of an array of antennas which has the particularity of being capable of working simultaneously in various frequency bands. This is achieved by means of using multiband antennas in strategic positions of the array. The disposition of the elements that constitute the MIA is obtained from the *juxtaposition* of conventional mono-band arrays, employing as many monoband arrays as frequency bands that it is wished to incorporate in the Multiband *Interleaved* Array. In those positions in which one or various elements originating in the conventional mono-band arrays *coincide*, a single multiband antenna (element) shall be employed which covers simultaneously the different bands. In the remaining nonconcurrent positions, it can be chosen to employ also the same multiband antenna or else recur to a conventional mono-band antenna which works at the pertinent frequency. The excitation at one or various frequencies of each element of the array depends therefore on the position of the element in the array and is controlled by means of the signal distribution network.

’191 Patent at 1:13–19 & 2:58–3:10 (emphasis added); *see also id.* at 4:21–22 (“A multiband interleaved array (MIA) is constituted by the juxtaposition of various conventional mono-band arrays”) & 5:8–9 (“The configuration of the MIA is obtained from the juxtaposition of the positions of the different mono-band arrays.”). The specification provides specific examples of monoband array positions coinciding:

In FIG. 7 the position of the elements is shown, as well as their working frequencies. The elements shown in white indicate operation in the GSM 900 band; the elements shown in black indicate operation in the GSM 1800 band and the elements marked in black in the lower triangle and in white in their two upper triangles indicate simultaneous operation in both bands. Precisely the simultaneous operation in both bands via a single *multiband element* (the multi-triangular element) in such positions of the array (*those positions at which those of the original mono-band arrays coincide*), is one of the main characteristic features of the MIA [(multiband interleaved array)] invention.

*Id.* at 7:56–67 (emphasis added).

The disposition of elements of the three classic mono-band arrays at the frequencies  $f$ ,  $f/2$  and  $f/3$  is shown in figures (3.[a]), (3.[b]) and (3.[c]) by means of black circles, circumferences and squares respectively. The column of figure (3.[d]) shows the disposition of elements in the tri-band *interleaved* array. In those positions in which *elements of the three arrays come together* (indicated in the drawing by the *juxtaposition* of the different geometric figures identifying each array), use is made of a multiband element; the same strategy is followed in those positions in which elements of two arrays coincide: use should be made of a multiband element capable of covering the frequencies pertinent to its position, preferentially the same element as that used in the remaining positions, selecting those frequencies which are necessary by means of the feeder network.

*Id.* at 6:20–34 (emphasis added).

These disclosures support Defendants’ proposal of “interleaving,” and Plaintiff has not shown support for its proposal of “overlapping.” At the March 25, 2019 hearing, Plaintiff stated that it believes “overlapping” and “interleaving” have the same meaning in this context.

The specification further discloses that antenna elements may be “repositioned”:

In the positions in which elements of the two conventional arrays (indicated in FIG. [1] (1.[c]) by means of black circles located at the centre of a circumference) coincide, a multiband antenna is employed . . . .

\* \* \*

In some configurations of multiband interleaved array, especially in those in which the different frequencies do not correspond to an integral factor of the highest frequency 1, it is required that the elements be repositioned, as in FIG. 5. In this particular example the frequencies  $f$ ,  $f/2$  and  $f/2,33$  have been chosen. The disposition of elements of the three classic mono-band arrays at the frequencies  $f$ ,  $f/2$  and  $f/2,33$  is represented in figures (5.[a]), (5.[b]) and (5.[c]) by means of black

circles, circumferences and squares respectively. The column of figure (5.[d]) shows what would be the disposition of elements in the tri-band interleaved array according to the same plan as in the previous examples. Notice how in this case the ratio of frequencies involves the collation of elements at intermediate positions which make its practical implementation difficult. The solution to be adopted in this case consists in *displacing the position of the element of the array that works at the lowest frequency (indicated by arrows) until it coincides with another element (that nearest) of the highest frequency array*; then the two or more coincident elements in the new position are replaced with a multiband element. An example of the final configuration once the elements have been *repositioned*, is shown in figure (5.[e]). It is important that the element displaced be preferentially that of the lowest frequency array, in this way the relative displacement in terms of the working wavelength is the least possible and the appearance of secondary or diffraction lobes is reduced to the minimum.

*Id.* at 5:30–33 & 6:66–7:25 (emphasis added); *see also id.* at Figs. 1 & 5.

This disclosure regarding elements being “repositioned” is also reflected in Claim 11 of the ’256 Patent, which depends from Claim 1. Claims 1 and 11 of the ’256 Patent recite (emphasis added):

1. An interlaced multiband antenna array comprising:
  - a plurality of antenna elements;
  - wherein the interlaced multiband antenna array is configured to simultaneously cover a plurality of licensed cellular frequency bands;
  - wherein positions of the plurality of antenna elements result from *juxtaposition* of at least a first antenna array operating in a first frequency band, and a second antenna array operating in a second frequency band;
  - wherein the first antenna array comprises a plurality of first-band antenna elements, and the second antenna array comprises a plurality of second-band antenna elements;
  - wherein the plurality of licensed frequency bands of the interlaced multiband antenna array includes said first frequency band and said second frequency band;
  - wherein the interlaced multiband antenna array employs a single multiband antenna element in positions where said first-band antenna element and said second-band antenna element come together; and
  - wherein the single multiband antenna element simultaneously covers at least said first frequency band and said second frequency band.

\* \* \*

11. The interlaced multiband antenna array of claim 1, wherein at least one first-band antenna element of the first antenna array is *repositioned* to coincide with a nearest second-band antenna element of the second antenna array.

Defendants’ proposed construction attempts to give effect to the patentee’s distinct usage of “juxtaposition” and “repositioned” by limiting “juxtaposition” to an interleaving of multiple arrays that maintains the spacing between adjacent elements of each array. At the March 25, 2019 hearing, Defendants stated that their proposal does not exclude repositioning, yet this would be the effect, at least under a natural reading of Defendants’ proposed language.

A better reading of the usage of “juxtaposition” and “repositioned,” as demonstrated by the above-reproduced claims, is that juxtaposition encompasses situations in which the relative positions of elements remain the same as well as situations in which certain elements are repositioned. *See also id.* at 6:66–7:25. The Court therefore rejects Defendants’ proposal that the term “juxtaposition” requires “maintaining the spacing” between adjacent elements of each array. *See Tr. of Columbia Univ. in City of N.Y. v. Symantec Corp.*, 811 F.3d 1359, 1370 (Fed. Cir. 2016) (“construing the independent claim to exclude material covered by the dependent claim would be inconsistent”).

Finally, Defendants have argued that the recital of positions that “result from juxtaposition” signals that these claims are “product-by-process” claims. *See SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1315 (Fed. Cir. 2006) (“A product-by-process claim is one in which the product is defined at least in part in terms of the method or process by which it is made.”) (citation and internal quotation marks omitted). “Typically, it is the wording of the claim which indicates that it is a product-by-process claim. For example, product-by-process claims employ terms such as ‘prepared in accordance with,’ ‘by the process of,’ whereby, ‘product of the process,’ ‘resulting from the process of,’ and ‘being produced by the process comprising.’” *Biacore v.*

*Thermo Bioanalysis Corp.*, 79 F. Supp. 2d 422, 456 (D. Del. 1999). Yet, “[t]he presence of acts recited in the claim does not transform a claim covering a thing . . . into one covering the process by which that thing was made.” *In re Nuijten*, 500 F.3d 1346, 1355 (Fed. Cir. 2007).

Here, the claims using “juxtaposition” specify the physical positions of multiband elements in the array, as contrasted with, for example, a side-by-side arrangement of monoband antenna arrays. In the context of these claims, this is a structural limitation. *See 3M Innovative Properties Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1368–71 (Fed. Cir. 2003) (in context of “multiple embossed,” “superimposed” patterns, finding that such terms described “the structural relationship between the embossing patterns” and did not trigger product-by-process claiming). Indeed, “even words of limitation that can connote with equal force a structural characteristic of the product or a process of manufacture are commonly and by default interpreted in their structural sense, unless the patentee has demonstrated otherwise.” *Id.* at 1371. Viewing the claimed invention in light of these authorities, Defendants’ arguments as to product-by-process are unpersuasive.<sup>3</sup> Defendants’ reliance on the opinions of Plaintiff’s expert are likewise unavailing. (*See* Dkt. No. 183-1, Feb. 13, 2019 Long Decl., at ¶¶ 14–15).

The Court therefore hereby construes “**juxtaposition**” to mean “**interleaving**.”<sup>4</sup>

---

<sup>3</sup> Defendants’ reliance on *Nassau Precision Casting Co. v. Acushnet Co.*, 566 F. App’x 933, 940 (Fed. Cir. June 6, 2014), is unpersuasive because the claim at issue was a method claim, not an apparatus claim, and the court concluded that the claim required performing the recited steps whether read as reciting a method or as reciting a product-by-process.

<sup>4</sup> Because the parties have presented no further dispute as to the present disputed terms apart from the dispute as to “juxtaposition,” no further construction is necessary.



**C. “multiband antenna,” “multiband antenna element,” and “multiband antenna array”**

<p style="text-align: center;"><b>“multiband antenna”</b> (’191 Patent, Claims 1, 5)</p> <p style="text-align: center;"><b>“multiband antenna element”</b> (’918 Patent, Claims 1, 5; ’768 Patent, Claims 1, 9, 16, 23, 30, 38; ’870 Patent, Claims 1, 11, 29; ’256 Patent, Claims 1, 17)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“an antenna element, which covers more than one frequency band, formed by portions coupled to each other electromagnetically which interact with each other in order to establish the radio-electric behavior of the antenna element, which with respect to radiation patterns and impedance is similar in multiple frequency bands”	“antenna element, formed by a set of elements coupled to each other electromagnetically which interact with each other in order to establish the radioelectric behavior of the antenna element, which with respect to radiation and impedance patterns is similar in multiple frequency bands” <sup>5</sup>
<p style="text-align: center;"><b>“multiband antenna array”</b> (’191 Patent, Claims 1, 5; ’918 Patent, Claims 1, 5; ’768 Patent, Claims 1, 9, 16, 23, 30, 38; ’870 Patent, Claims 1, 2, 11, 20; ’256 Patent, Claims 1, 17)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
“antenna array that covers more than one frequency band” <sup>6</sup>	“antenna array that is useable at more than one frequency band”

(Dkt. No. 132, Ex. B, at 7–10; *see* Dkt. No. 238-1, Ex. A, at 1–2, 3–4, 8, 20, 26, 34–35 & 41.)

<sup>5</sup> Defendants previously proposed: “antenna element, *usable at more than one frequency band*, formed by a set of elements coupled to each other electromagnetically which interact with each other in order to establish the radio-electric behavior of the antenna element, which with respect to radiation and impedance patterns is similar in multiple frequency bands.” (Dkt. No. 132, Ex. B at 7 (emphasis added).)

<sup>6</sup> Plaintiff previously proposed: “‘Multiband antenna array’ by itself is not limiting. To the extent it is limiting and a construction is necessary, it should be afforded its plain and ordinary meaning of an ‘array that covers more than one frequency band.’” (Dkt. No. 132, Ex. B at 10.)

### (1) The Parties' Positions

Plaintiff argues that its proposal of “covers more than one frequency band” “is taken directly from the specification.” (Dkt. No. 183, at 13.) Nonetheless, Plaintiff argues, “deviating from the specification language to use the phrase ‘formed by portions’ is necessary to avoid jury confusion, and to bring the construction in line with the parallel language in the claims.” (*Id.*) Finally, Plaintiff argues: “While both radiation and impedance can be referred to as a pattern, it is more common for a person of ordinary skill in the art to simply refer to ‘impedance’ standing alone. Fractus proposes adoption of the more common phrasing to reduce any potential jury confusion.” (*Id.*, at 14.)

Defendants respond that the specification expressly defines the term “multiband antenna,” and “[e]ach of Fractus’s proposed revisions is unsubstantiated and violates basic claim construction principles.” (Dkt. No. 211, at 4.) Defendants also argue that Plaintiff’s proposal of “covers” is inconsistent with Plaintiff’s arguments in Civil Action No. 2:17-CV-561, *Fractus, S.A. v. ZTE Corp., et al.* (“ZTE”). (*Id.*, at 11.)

Plaintiff replies that whereas its proposal of “covers more than one frequency band” is supported by the specification, Defendants’ proposal of “usable at” is not. (Dkt. No. 218, at 3–4.) Plaintiff also argues that because “the term ‘element’ is used in the claims and elsewhere in the specification to mean the individual antennas that make up the array,” “Fractus therefore proposes substituting ‘portions’ to avoid confusion between those two uses.” (*Id.*, at 4–5.)

### (2) Analysis

Claim 1 of the ’191 Patent, for example, recites (emphasis added):

1. An interlaced *multiband antenna array* having a plurality of antenna elements, wherein the *multiband antenna array* works simultaneously on a plurality of frequencies,

the *multiband antenna array* being characterised in that the position of the elements in the array results from the juxtaposition of a plurality of mono-band arrays, wherein the number of mono-band arrays corresponds to the number of working frequencies of the *multiband antenna array*,

the *multiband antenna array* employing a single *multiband antenna* in those positions of the *multiband antenna array* in which the positions of two or more elements of the mono-band arrays come together, wherein the single *multiband antenna* covers at least two working frequencies of the *multiband antenna array*.

The specification discloses:

A multiband antenna is understood to be an antenna formed by a set of elements coupled to each other electromagnetically which interact with each other in order to establish the radio-electric behaviour of the antenna, behaviour which with respect to radiation and impedance patterns is similar in multiple frequency bands (hence the name multiband antenna). Numerous examples of multiband antennas are described in the literature. In 1995 antennas of the fractal or multifractal type were introduced (the coining of the terms fractal and multifractal is attributable to B. B. Mandelbrot in his book *The Fractal Geometry of Nature*, W. H. Freeman and Co. 1983), antennas which by their geometry have a multifrequency behaviour and, in determined cases, a reduced size (C. Puente, R. Pous, J. Romeu, X. Garcia “Antenas Fractales o Multifractales”, (Spanish patent P9501019). Subsequently multi-triangular antennas were introduced (Spanish patent P9800954) which could work simultaneously in the GSM 900 and GSM 1800 bands and, more recently, multilevel antennas (Patent PCT/ES99/00296), which offer a clear example of how it is possible to shape the geometry of the antenna in order to achieve a multiband behaviour.

’191 Patent at 2:33–54. The parties have also discussed disclosures in the specification regarding “elements” as being antennas. ’191 Patent at 1:65 (“elements (antennas)”), 2:66–3:3 (“a single multiband antenna (element)”), 4:23–29 (“elements (antennas)”) & 9:29–41 (“multiband element”).

On balance, the disclosure regarding what a multiband antenna “is” (’191 Patent at 2:33–39) amounts to a definition set forth by the patentee, and “the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316; *see Sinorgchem Co., Shandong v. Int’l Trade Comm’n*, 511 F.3d 1132, 1136 (Fed. Cir. 2007) (“[T]he word ‘is’ . . . may signify that a patentee is serving as its own lexicographer.”) (citation and internal quotation marks omitted).

Plaintiff has noted that the word “covers” appears in certain claims, but this does not warrant applying the word “covers” to all instances of the disputed terms. *See* ’191 Patent at Cl. 1 (“wherein the single multiband antenna covers at least two working frequencies of the multiband antenna array”); *see also* ’918 Patent at Cls. 1 & 5; ’256 Patent at Cls. 1 & 17. Likewise, disclosures in the specification that use the word “covers” do not warrant setting aside the clear lexicography discussed above. *See id.* at 1:15–18 (“multiband antenna which covers the different working frequency bands”); *id.* at 3:1–3 (“a single multiband antenna (element) shall be employed which covers simultaneously the different bands”); *Sinorgchem*, 511 F.3d at 1136 (“the patentee must be bound by the express definition”).

Also, the word “portions,” proposed by Plaintiff, does not appear in the specification. The parties have discussed prosecution history in which the patentee referred to a multiband antenna as being formed by “portions” (rather than by a set of “elements”). For example, during prosecution of the ’493 Patent, the patentee stated:

Independent claims 22, 32, and 39 include the feature “each antenna element of the first plurality of antenna elements comprises a plurality of *portions* electromagnetically coupled both at the first continuous frequency range and at the second continuous frequency range”. *As disclosed in the subject specification*, such elements of the first plurality of antenna elements are *multiband antennas*, since such elements are characterized by the interaction between *portions* to provide operation in the first and the second continuous frequency range.

(Dkt. No. 211, Ex. 13, Aug. 26, 2013 Amendment, at 8 (emphasis added). Plaintiff urges that referring to “portions” rather than “elements” will prevent confusion that might arise in light of “element” being a separately disputed term. The claims at issue in this prosecution history, however, expressly recited “portions.” *See id.*; *see also id.*, Ex. 19, Nov. 2, 2010 Amendment in Response to Non-Final Office Action (’870 Patent), at 12–13.)

Moreover, “[w]here, as here, the written description clearly identifies what his invention is, an expression by a patentee during prosecution that he intends his claims to cover more than what his specification discloses is entitled to little weight.” *Honeywell Int’l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1319 (Fed. Cir. 2006). Also of note, Defendants have submitted a technical dictionary definition of “radiating element” that is consistent with the above-reproduced definition set forth in the specification. (Dkt. No. 211, Ex. 11, *McGraw-Hill Dictionary of Scientific and Technical Terms* 1730 (6th ed. 2003) (“Basic subdivision of an antenna which in itself is capable of radiating or receiving radio-frequency energy.”).)

Finally, Plaintiff has failed to demonstrate that its proposal of “radiation patterns and impedance” is any clearer than “radiation and impedance patterns.” The opinions of Plaintiff’s expert to the contrary are unpersuasive. (See Dkt. No. 183-1, Feb. 13, 2019 Long Decl., at ¶ 17.) Indeed, Plaintiff itself has stated that “a person of ordinary skill would readily understand the term ‘impedance pattern.’” (Dkt. No. 183, at 24.) The Court therefore applies the above-reproduced definition set forth in the specification.<sup>7</sup>

The Court thus hereby construes the disputed terms<sup>8</sup> as set forth in the following chart:

---

<sup>7</sup> The Court changes the spelling of “behaviour” to “behavior.”

<sup>8</sup> On March 15, 2019, the parties filed their P.R. 4-5(d) Joint Claim Construction Chart. (Dkt. No. 222.) On March 25, 2019, the day of the claim construction hearing, the parties filed two “Corrected” P.R. 4-5(d) Joint Claim Construction Charts. The first, filed at 11:32 A.M. (Dkt. No. 236), was superseded by the second (Dkt. No. 238 & Dkt. No. 238-1), filed at 1:18 P.M. In general, “[t]he purpose of this claim construction chart is to assist the Court and the parties in tracking and resolving disputed terms.” P.R. 4-5(d)(3). This filing requirement thus promotes the conduct of orderly and efficient claim construction proceedings, including the claim construction hearing. The parties filed their 43-page “Corrected” Joint Claim Construction Chart *12 minutes* prior to the start of the claim construction hearing at 1:30 P.M. (See Dkt. No. 165, at 3; see also Dkt. No. 240.) As noted by the Court during the March 25, 2019 hearing, no party contacted the Court in advance of this filing to alert the Court to potential changes in the terms being proposed for construction and the parties’ proposed constructions. Indeed, the “Corrected” filing itself contains no explanation for the late filing but instead merely attaches a duplicative “Exhibit A” (albeit with inconsistent pagination, compare Dkt. No. 238 at 9–51 with Dkt. No. 238-1) that the parties

<u>Term</u>	<u>Construction</u>
<b>“multiband antenna”</b> (’191 Patent, Claims 1, 5)	<b>“an antenna formed by a set of elements coupled to each other electromagnetically which interact with each other in order to establish the radio-electric behavior of the antenna, behavior which with respect to radiation and impedance patterns is similar in multiple frequency bands”</b>
<b>“multiband antenna element”</b> (’918 Patent, Claims 1, 5; ’768 Patent, Claims 1, 9, 16, 23, 30, 38; ’870 Patent, Claims 1, 11, 29; ’256 Patent, Claims 1, 17)	<b>Plain meaning</b> (apart from the Court’s construction of “multiband antenna”)

---

referred to during the hearing as a “red-line” version of the Joint Claim Construction Chart. This “red-line” version includes the terms “mono-band array,” “mono-band antenna array,” and “mono-band antenna element.” (Dkt. No. 238-1, Ex. A at 2, 15 & 26–27.) These terms appeared as distinct disputed terms in the parties’ P.R. 4-3 Joint Claim Construction and Prehearing Statement, prior to the start of briefing. (Dkt. No. 132, Ex. B, at 41, 43 & 45.) Plaintiff did not specifically address these terms in its briefing. (See Dkt. Nos. 183 & 218.) Instead, these terms appeared only as part of larger disputed terms. (See, e.g., Dkt. No. 183 at 4–6 & 26.) These terms appeared in Defendants’ responsive claim construction brief but only in a heading together with other terms and not in any discussion specific to these terms. (See Dkt. No. 211, at 11.) These terms did *not* appear as distinct disputed terms in the P.R. 4-5(d) Joint Claim Construction Chart filed on March 15, 2019. (See Dkt. No. 222.) These terms reappeared in the “Corrected” P.R. 4-5(d) Joint Claim Construction Chart, ***without explanation, filed on the day of the claim construction hearing--and filed a mere 12 minutes prior to the start of that hearing.*** (See Dkt. No. 238; see also Dkt. No. 238-1, Ex. A at 2, 15 & 26–27.) The terms **“mono-band array,” “mono-band antenna array,”** and **“mono-band antenna element”** have not been properly presented for construction by the Court. Alternatively, and to the extent, if any, that it is determined such terms were somehow properly before the Court, then the Court finds that no construction is necessary, and the Court interprets these terms to have their **plain meaning**, particularly in light of the Court’s analysis of “multiband antenna” as to Plaintiff’s proposal of “covers” and Defendants’ withdrawal of their proposal of “usable at.” The Court finds the parties’ conduct in regard to their “Corrected” P.R. 4-5(d) Joint Claim Construction Chart to be without excuse and reflective of a material disregard for the patent rules of this Court and their responsibilities as parties (and counsel) before this Court.

<b>“multiband antenna array”</b>  ('191 Patent, Claims 1, 5; '918 Patent, Claims 1, 5; '768 Patent, Claims 1, 9, 16, 23, 30, 38; '870 Patent, Claims 1, 2, 11, 20; '256 Patent, Claims 1, 17)	<b>Plain meaning</b> (apart from the Court's construction of “multiband antenna”)
---	---

**D. “interlaced multiband antenna array”**

<p align="center"><b>“interlaced multiband antenna array”</b>  ('191 Patent, Claim 1; '918 Patent, Claim 1; '768 Patent, Claims 1, 9, 16, 23, 30, 38; '870 Patent, Claims 1, 11, 20; '256 Patent, Claims 1, 17; '493 Patent, Claims 1, 11, 18)</p>	
<b>Plaintiff's Proposed Construction</b>	<b>Defendants' Proposed Construction</b>
“Interlaced multiband antenna array” by itself is not limiting. To the extent it is limiting and a construction is necessary, it should be construed as an “antenna array that covers more than one frequency band achieved by using multiband antennas in strategic positions where the disposition of the elements of the array is obtained from the juxtaposition of conventional monoband arrays.” <sup>9</sup>	“a multiband antenna array, in which monoband antenna elements useable at one frequency band are interleaved with monoband antenna elements useable at another frequency band”

(Dkt. No. 132, Ex. B, at 10–11; Dkt. No. 183, at 14; *see* Dkt. No. 238-1, Ex. A, at 1, 6, 12, 20, 24, 32, 35 & 41–42.)

(1) The Parties' Positions

Plaintiff argues that “[a]ll of the structural detail claimed in the patents is set out using other claim language,” and “[t]he term should be given very little, if any, distinct meaning.” (Dkt. No. 183, at 15.) Plaintiff submits that its alternative proposed construction “mirrors the language

---

<sup>9</sup> Plaintiff previously proposed: “This term is not limiting. To the extent it is limiting and a construction is necessary, it should be construed as ‘an array of antennas capable of working simultaneously in various frequency bands achieved by using multiband antennas in strategic positions where the disposition of the elements of the array is obtained from the juxtaposition of conventional monoband arrays.’” (Dkt. No. 132, Ex. B, at 10–11.)

in the specification used to describe the invention as a whole.” (*Id.*) Plaintiff argues that Defendants’ proposed construction should be rejected because “[t]he patent does not require that the multiband antenna arrays include *any* monoband elements at all.” (*Id.*, at 16.) Plaintiff suggests that “Defendants seem to be confusing (1) the juxtaposition of monoband arrays to determine the positioning of elements in the final multiband array with (2) a requirement that the monoband elements actually be present in the final multiband array.” (*Id.*)

Defendants respond that Plaintiff “omits the concept of interlaced/interleaved altogether from its proposal for ‘*interlaced* multiband antenna array’—which happens to be the very title of the asserted patents.” (Dkt. No. 211, at 12.)

Plaintiff replies that “Defendants’ proposed construction suggest[s] that the monoband elements are in fact present in the resulting array.” (Dkt. No. 218, at 6.) Plaintiff submits that this is “a meaning Defendants now say they did not intend,” and “[s]uch confusion should be avoided at trial.” (*Id.*)

## (2) Analysis

This disputed term appears in the body of each of the claims identified by the parties, except for Claim 1 of the ’191 Patent, in which the term “interlaced multiband antenna array” appears only in the preamble. In some cases, a phrase that appears in the preamble may “merely give[] a descriptive name to the set of limitations in the body of the claim that completely set forth the invention.” *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1434 (Fed. Cir. 2000). In the present case, however, this term in the preamble provides antecedent basis for “the multiband antenna array” recited in the body of the claim. *See Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) (“When limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the



claimed invention.”). The parties’ arguments therefore apply equally to all of the claims here at issue.

Claim 1 of the ’918 Patent, for example, recites (emphasis added):

1. An *interlaced multiband antenna array* comprising:
  - a plurality of antenna elements;
  - wherein *the interlaced multiband antenna array* is adapted to operate simultaneously on a plurality of frequency bands;
  - wherein positions of the plurality of antenna elements result from juxtaposition of a plurality of mono-band antenna arrays;
  - wherein the number of the plurality of mono-band antenna arrays corresponds to the number of working frequency bands of *the interlaced multiband antenna array*;
  - wherein *the interlaced multiband antenna array* employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together; and
  - wherein the single multiband antenna element covers at least two working frequency bands of *the interlaced multiband antenna array*.

The parties agree that “interlaced” and “interleaved” have the same meaning in the patents-in-suit (Dkt. No. 218, at 6), and the specification discloses as follows regarding “multiband interleaved array”:

The array configuration is described on a *basis of the juxtaposition or interleaving of various conventional single-band arrays* operating in the different bands of interest. In those *positions* where elements of different multiband arrays come together, use is made of a multiband antenna which covers the different working frequency bands.

\* \* \*

A Multiband Interleaved Array (MIA) consists of an array of antennas which has the particularity of being capable of working simultaneously in various frequency bands. This is achieved by means of using multiband antennas in *strategic positions* of the array. The disposition of the elements that constitute the MIA is obtained from the juxtaposition of conventional mono-band arrays, employing as many mono-band arrays as frequency bands that it is wished to incorporate in the Multiband Interleaved Array. In those *positions* in which one or various elements originating in the conventional mono-band arrays coincide, a single multiband antenna (element) shall be employed which covers simultaneously the different bands. In the remaining nonconcurrent positions, it can be chosen to employ also

the same multiband antenna or else recur [*sic*] to a conventional mono-band antenna which works at the pertinent frequency.

'191 Patent at 1:13–18 & 2:58–3:6 (emphasis added); *see id.* at 7:62–67 (“simultaneous operation in both bands via a single multiband element” in “positions at which those of the original mono-band arrays coincide” “is one of the main characteristic features of the MIA invention”); *see also id.* at 8:29–50 & Fig. 8.

The specification thus “underscores the importance” of using an interlaced multiband antenna array. *Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1358 (Fed. Cir. 2012). And, in general, “claims are interpreted with an eye toward giving effect to all terms in the claim.” *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006). The Court adopts Defendants’ proposal of “interleaved” and rejects Plaintiff’s proposal of merely “strategic positions.”

The above-cited disclosures explain that monoband array elements are not necessarily actually present in the interlaced multiband antenna array. At the March 25, 2019 hearing, Defendants agreed. Rather, the specification refers to the relative positions of elements in monoband arrays. *See* '191 Patent at 1:13–18, 2:58–3:6, 7:62–67 & 8:29–50 & Fig. 8. As another example, Claim 4 of the '870 Patent recites that “at least two mono-band antenna elements of the plurality of mono-band antenna arrays come together in each *position* of the interlaced multiband antenna array.” The above-reproduced claim language in Claim 1 of the '918 Patent is consistent with this interpretation, such as the recital that “the interlaced multiband antenna array employs a single multiband antenna element in *positions* where a plurality of antenna elements of the mono-band antenna arrays come together.”

The Court therefore hereby construes **“interlaced multiband antenna array”** to mean **“multiband antenna array in which the positions of antenna elements are based on interleaving the positions of antenna elements in two or more monoband arrays.”**

#### E. “frequency band”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“a range of radio frequencies designated for a cellular service”	“range of frequencies extending between two limiting frequencies”

(Dkt. No. 132, Ex. B, at 28; Dkt. No. 238-1, Ex. A, at 10, 15, 17, 21, 27, 30–31, 36 & 42.) The parties submit that this term appears in Claims 12, 14, and 15 of the ’191 Patent, Claims 1, 5, 9, 12, 14, 15, 19, 24, and 25 of the ’918 Patent, Claims 1, 2, 3, 5, 6, 9, 13, 14, 16–18, 21, 23–27, 30–33, 35, 36, 38, 39, 41, and 42 of the ’768 Patent, Claims 1, 3, 5–9, 11, 13–18, 20–27, and 33–37 of the ’870 Patent, Claims 1 and 13–17 of the ’256 Patent, Claims 6, 7, and 18 of the ’493 Patent, and Claims 8, 16, and 17 of the ’940 Patent. (Dkt. No. 132, Ex. B, at 28–29.)

##### (1) The Parties’ Positions

Plaintiff argues that whereas its proposal comports with the ordinary and customary meaning of this term in the context of the specification as a whole, “Defendants would unmoor the term ‘frequency band’ from any real-world operational meaning at all, eviscerating the term of its intended meaning and resulting in unacceptable absurdities.” (Dkt. No. 183, at 17–18.) Plaintiff explains that “[i]f the definition of ‘frequency band’ allows the band to be *any* size, untethered to any functional or practical considerations, then *any* antenna would cover multiple frequency bands, even a paper clip.” (*Id.*, at 21.) Plaintiff urges that “the patents consistently use the term ‘frequency band’ to mean a range of frequencies allocated for a cellular service, and clearly distinguish coverage of multiple cellular bands as the advantage and distinction of the invention.” (*Id.*, at 20.)

Defendants respond that rather than being limited to cellular frequencies, “if an antenna can radiate in only one range—between two limiting frequencies—then it is not a multi-band

antenna; if it can radiate in more than one range of frequencies, it is a multi-band antenna.” (Dkt. No. 211, at 6.)

Plaintiff replies that “Fractus’s proposed construction is based on the clear and consistent use of ‘frequency band’ in the specification to refer only to the ranges of frequencies designated for a cellular service.” (Dkt. No. 218, at 6.) “Fractus concedes that in other contexts, ‘frequency bands’ may refer to bands other than those designated for a cellular service,” but Plaintiff maintains that this “does not change how the term ‘frequency band’ is used in the context of *these* patents.” (*Id.*, at 7.) Finally, Plaintiff argues that “the dictionary definitions and other extrinsic evidence on which Defendants rely are not inconsistent with Fractus’s position, which acknowledges that ‘frequency bands’ may mean something more general in other contexts.” (*Id.*)

## (2) Analysis

As a threshold matter, Defendants propose the same construction proposed by Plaintiff as to a different patent in *Fractus, S.A. v. ZTE Corp., et al.*, No. 2:17-CV-561 (“*ZTE*”). (Dkt. No. 211, Ex. 14, Fractus’s Opening Claim Construction Brief, at 25 (proposing that “frequency band” be construed to mean “a range of frequencies extending between two limiting frequencies”). Although Defendants submit that the present patents-in-suit cite the application that issued as one of the patents addressed in *ZTE* (*see* ’191 Patent at 2:48–54), Defendants have not identified any authority that would compel limiting Plaintiff to its proposal in a different case as to a different patent. *See Symantec*, 811 F.3d at 1369. Also, the Court did not adopt that proposed construction in *ZTE*. No. 2:17-CV-561, Dkt. No. 93 at 54–56.

Turning to the intrinsic evidence, the specification describes the claimed invention as being advantageous for cellular telephone systems. For example, the specification discloses:

This purely geometric limitation [of monoband arrays] (the magnitude of the wavelength conditions the geometry of the elements of the array and their relative

spacing) signifies a major drawback in those environments and communication systems in which various frequency bands have to be employed simultaneously. A clear example is the GSM cellular mobile telephony system. Initially located in the 900 MHz band, the GSM system has turned into one of the most widespread on a world scale. The success of the system and the spectacular growth in demand for this type of service has led to the cellular mobile telephony operators expanding its service into a new band, the 1800 MHz band, in order to provide coverage for a greater customer base. Making use of classic mono-band antenna technology, the operators have to duplicate their antenna network in order to provide coverage simultaneously to GSM 900 and GSM 1800. Using a single MIA specially designed for the system (like that described in the particular cases of FIGS. 7 through 12), the operators reduce the cost of their network of base stations, the time to expand into the new band and the visual and environmental impact of their installations (through the simplification of the overall radiating structure).

\* \* \*

More examples of particular configurations of MIAs are described below. In the five examples described, various designs are presented for GSM 900 and GSM 1800 systems (890 MHz–960 MHz and 1710 MHz–1880 MHz bands)[.] It is a question of antennas for cellular telephony base stations, which present basically the same radiofrequency behavior in both bands; by employing such versions of MIA antenna the operators reduce the number of antennas installed to one half, minimising the cost and environmental impact of their base stations.

'191 Patent at 4:35–56 & 7:32–41.

Further, in the prosecution history cited by Defendants, no relevant definitive statements are apparent that would compel a broad reading of “frequency band.” (*See* Dkt. No. 211, Ex. 16, May 26, 2006 Amendment in Response to Non-Final Office Action ('918 Patent), at 13; *id.*, Ex. 19, Nov. 2, 2010 Amendment in Response to Non-Final Office Action ('870 Patent), at 12–13; *cf. Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003) (“As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public’s reliance on *definitive* statements made during prosecution.”) (emphasis added).)

On the other hand, Claims 12, 14, and 15 of the '191 Patent, Claims 1 and 17 of the '256 Patent, and Claims 6 and 7 of the '493 Patent expressly recite cellular frequency bands. For

example, Claims 1 and 17 of the '256 Patent recite, in relevant part: “wherein the interlaced multiband antenna array is configured to simultaneously cover a plurality of licensed cellular frequency bands.” The recital of “cellular frequency bands” weighs against limiting the term “frequency bands” to being “cellular.” *See Phillips*, 415 F.3d at 1314 (“the claim in this case refers to ‘steel baffles,’ which strongly implies that the term ‘baffles’ does not inherently mean objects made of steel”). The specification is consistent with a broad reading. *See* '191 Patent at 4:57–63 (“It is important to point out that the scenario which has just been outlined above deals only with one particular example of a type of MIA and its application; as may well be gauged by anyone familiar with the subject, in no way are the MIAs which are described in the present invention restricted to said specific configuration and can easily be adapted to other frequencies and applications”).<sup>10</sup>

Likewise, in the prosecution history cited by Plaintiff, the patentee referred to “cellular” frequency bands but did so in the context of claim language that expressly recited cellular frequency bands. (*See* Dkt. No. 211, Ex. 13, Aug. 26, 2013 Amendment After Final Action, at 2–3, 10 & 12.) The parties have also discussed prosecution history that refers to satellite communications, and “Fractus concedes that in other contexts, ‘frequency bands’ may refer to bands other than those designated for a cellular service . . . .” (Dkt. No. 218, at 7.)

Further, Defendants have submitted extrinsic technical dictionaries that define “frequency band” as being a range of frequencies. (*See* Dkt. No. 211, Ex. 10, *The Authoritative Dictionary of IEEE Standards Terms* 458 (7th ed. 2000) (“A continuous range of frequencies extending between two limiting frequencies.”); *see also id.*, Ex. 11, *McGraw-Hill Dictionary of Scientific and*

---

<sup>10</sup> Also, Plaintiff’s proposal of “designated for a cellular service” suffers from potentially having “different meanings at different times.” *PC Connector Solutions LLC v. SmartDisk Corp.*, 406 F.3d 1359, 1363 (Fed. Cir. 2005).

*Technical Terms* 854 (6th ed. 2003) (“A continuous range of frequencies extending between two limiting frequencies.”); *id.*, Ex. 12, *Modern Dictionary of Electronics* 304 (7th ed. 1999) (“A continuous and specific range of frequencies. A range of frequencies between a lower and an upper limit.”); *id.*, Ex. 21, *Hargrave’s Communications Dictionary* 221 (“A contiguous range of frequencies extending between two specified limiting frequencies”).)

The remaining issue, then, is whether the intrinsic evidence cited by Plaintiff establishes a *disclaimer* of non-cellular frequency bands. In some cases, “when the scope of the invention is clearly stated in the specification, and is described as the advantage and distinction of the invention, it is not necessary to disavow explicitly a different scope.” *On Demand Mach. Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1340 (Fed. Cir. 2006); *see also Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1301–02 (Fed. Cir. 2004) (“terms may be redefined away from their ordinary meaning by their consistent use in the specification”); *GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1370 (Fed. Cir. 2016) (“We have recognized that when a patent repeatedly and consistently characterizes a claim term in a particular way, it is proper to construe the claim term in accordance with that characterization.”) (citation and internal quotation marks omitted).

On balance, the disclosures cited by Plaintiff, such as those reproduced above, contain no “clear,” “deliberate[],” “unmistakable” manifestation of a disclaimer. *Openwave Sys., Inc. v. Apple Inc.*, 808 F.3d 509, 513 (Fed. Cir. 2015) (citations and internal quotation marks omitted). Further, “[i]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Id.* at 514 (citations and

internal quotation marks omitted).<sup>11</sup> Reading the patent as a whole, the term “frequency band” should be afforded its full scope. *See Phillips*, 415 F.3d at 1313 (“the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent”).

Plaintiff argues that under Defendants’ interpretation of “frequency band,” even the “conventional” monoband antenna arrays disclosed in the specification would cover multiple frequency bands if the frequency bands are arbitrarily defined. *See* ’191 Patent at 4:23–26 (“conventional antenna arrays usually have a mono-band behaviour (that is, they work within a relatively small frequency range, typically of the order of 10% about a centre frequency)”). Yet, some of the claims use the term “frequency band” in the context of “juxtaposition of a plurality of mono-band antenna arrays” (*see, e.g.*, ’191 Patent, Cl. 12; ’918 Patent, Cl. 1; ’768 Patent, Cl. 1; ’870 Patent, Cl. 1), and others specifically refer to “licensed cellular frequency bands” (*see, e.g.*, ’256 Patent, Cl. 1; ’493 Patent, Cl. 6; ’940 Patent, Cl. 8). Thus, the context provided by surrounding claim language addresses Plaintiff’s argument that, under Defendants’ proposed construction, “*any* antenna would cover multiple frequency bands, even a paper clip.” (Dkt. No. 183, at 21.)

Finally, Defendants’ proposal of “extending between two limiting frequencies” is unnecessary, particularly in light of disclosures in the specification, such as reproduced above, that provide context by disclosing frequency bands having defined endpoints. To whatever extent a party contends that a range does not have endpoints, the Court rejects this contention.

---

<sup>11</sup> Also of note, Claim 13 of the ’191 Patent (as corrected by a July 24, 2007 Certificate of Correction) recites that “the working frequency bands are situated around 1900 MHz and 3500 MHz in order to provide service simultaneously for *cordless and local radio* access communication systems.”



The Court therefore hereby construes **“frequency band”** to mean **“a range of frequencies.”**

**F. “situated around”**

<p align="center"><b>“situated around”</b>  ('918 Patent, Claims 12, 14, 15, 19, 24;  '768 Patent, Claims 3, 5, 6, 13, 16, 24–27, 33, 35, 36, 39, 41, 42;  '870 Patent, Claims 3, 7–9, 13, 16–18, 22, 24, 25, 27, 35–37;  '256 Patent, Claims 13–15)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary. If this term needs a construction, it should be afforded its plain and ordinary meaning, which is “includes.”	Indefinite
<p align="center"><b>“wherein the working frequency bands are situated around 900 MHz and 1800 MHz”</b>  ('918 Patent, Claim 12)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary after construction of “situated around” and “frequency band.” If construction is needed, the term should be afforded its plain and ordinary meaning, which is, “wherein the working [frequency bands] include 900 MHz and 1800 MHz.”	Indefinite

<p align="center"><b>“wherein the working frequency bands are situated around 900 MHz, 1800 MHz, and 2100 MHz”</b> (’918 Patent, Claim 14)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary after construction of “situated around” and “frequency band.” If construction is needed, the term should be afforded its plain and ordinary meaning, which is, “wherein the working [frequency bands] include 900 MHz, 1800 MHz and 2100 MHz.”	Indefinite
<p align="center"><b>“wherein at least one of the plurality of working frequency bands is situated around 1900 MHz”</b> (’768 Patent, Claim 13)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary after construction of “situated around” and “frequency band.” If construction is needed, the term should be afforded its plain and ordinary meaning, which is, “wherein at least one of the plurality of working [frequency bands] includes 1900 MHz.”	Indefinite

<p align="center"><b>“an operating frequency of the first continuous frequency range is situated around 900 MHz and an operating frequency of the second continuous frequency range is situated around 1800 MHz”</b> (’493 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary after “situated around” and “frequency band” are construed. If construction is needed, this term should be afforded its plain and ordinary meaning, which is, “an operating frequency of the first continuous frequency range includes 900 MHz and an operating frequency of the second continuous frequency range includes 1800 MHz.”	Indefinite

(Dkt. No. 132, Ex. B, at 32; Dkt. No. 183, at 21; Dkt. No. 238-1, Ex. A, at 10, 17–18, 21, 31 & 42.)

(1) The Parties’ Positions

Plaintiff argues that “around” in this context is not a term of degree. (Dkt. No. 183, at 22.) Rather, Plaintiff argues, “[a] frequency band is ‘situated around’ a given frequency if its lower bound is below that frequency and the upper bound above it—in other words, it includes the specified frequency.” (*Id.*)

Defendants respond that “[t]he claims provide no guidance, much less objective boundaries, regarding how close the working frequency bands must be to the specified frequencies,” and “[t]he intrinsic record is similarly unhelpful, as ‘situated around’ appears nowhere other than in the claims.” (Dkt. No. 211, at 27.)

Plaintiff replies that “Defendants continue to fundamentally misread ‘situated around’ as ‘near,’ an intentional misreading that imports uncertainty into the claims.” (Dkt. No. 218, at 7.)

## (2) Analysis

Claim 19 of the '918 Patent, for example, cited by Defendants, recites (emphasis added):

19. The interlaced multiband antenna array of claim 1, wherein the working frequency bands are *situated around* 800 MHz, 1900 MHz, and 2100 MHz.

The phrase “situated around” does not appear in the specification, and the only use of the word “situated” in the specification is not relevant in the context of the disputed term. *See* '191 Patent at 1:9–13 (“The present invention consists of antenna arrays which can be operated simultaneously in various frequency bands thanks to the physical disposition of the elements that constitute it, as well as the multiband behaviour of some elements *situated* strategically in the array.”) (emphasis added).

Yet, as a threshold matter, Defendants have not shown that “situated around” is a term of degree. For example, “situated around” does not resemble a term such as “small positive difference” in the *Input/Output* case cited by Defendants. *Input/Output, Inc. v. Sercel, Inc.*, No. 5:06-CV-236, 2008 WL 5427982, at \*25–\*26 (E.D. Tex. Apr. 28, 2008) (finding lack of guidance for measuring “small”); *see Sonix*, 844 F.3d at 1378 (regarding “visually negligible,” “turn[ing] . . . to the written description[] to determine whether there is some standard in the written description for measuring visual negligibility”).

“In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Phillips*, 415 F.3d at 1314. This is such a case, particularly in the context in which the phrase “situated around” is used in the disputed terms. The word “around” is not used in a sense of nearness or approximation but rather is used to refer to frequencies on either side of a particular frequency, that is, frequencies higher and lower than a particular frequency. (*See* Dkt. No. 211,

Ex. 30, *The Oxford American Dictionary and Language Guide* 48 (1999) (including a definition of “around” as “on every side; on all sides”).)

Moreover, even if “situated around” were deemed to be a term of degree, this term is readily understandable in the context in which it is used. *See Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014) (“We do not understand the Supreme Court to have implied in *Nautilus*, and we do not hold today, that terms of degree are inherently indefinite.”). The specification reinforces that the phrase is readily understandable by disclosing ranges: “More examples of particular configurations of MIAs are described below. In the five examples described, various designs are presented for GSM 900 and GSM 1800 systems (890 MHz–960 MHz and 1710 MHz–1880 MHz bands).” ’191 Patent at 7:32–35. Also, the specification uses the term “working frequencies” with reference to “bands” rather than one specific frequency. *Id.* at 8:37–46. These disclosures inform the recital in Claim 12 of the ’191 Patent, for example, that “the working frequency bands are *situated around* 900 MHz and 1800 MHz in order to provide service simultaneously for the GSM 900 and GSM 1800 cellular mobile telephony systems.” The opinions of Plaintiff’s expert are further persuasive in this regard. (*See* Dkt. No. 183-1, Feb. 13, 2019 Long Decl. ¶ 8 (“In antenna engineering a frequency band is often referred to by simply using an easy to remember single frequency that is within the band rather than always calling it by its lower and upper frequency limits.”).)

The opinions of Defendants’ expert to the contrary are unpersuasive. (*See* Dkt. No. 211, Ex. 6, Jan. 14, 2019 Ali Decl. ¶ 50 (“The term ‘situated around’ is one of degree that, in the context of the limitations listed above, relates to how near (or ‘around’) the claimed frequency band must be to the claimed frequency.”); *see also id.* ¶¶ 48–50.)

Defendants have argued that Plaintiff's interpretation of "situated around" is vague because "a frequency range from 1700 to 2100 MHz would be 'situated around' 1800, 1900, and 2100 MHz (among hundreds of other frequencies), even though all are claimed separately, sometimes in the same claim." (Dkt. No. 211, at 28.) Claim 18 of the '870 Patent, for example, recites that "three working frequency bands of the plurality of working frequency bands are situated around 1800 MHz, 1900 MHz, and 2100 MHz."

Defendants have not shown, however, that the possibility of different frequency bands being defined in different ways or with different bandwidths gives rise to any lack of reasonable certainty as to the meaning of the present disputed terms. Instead, these are implementation-specific details. "The resolution of some line-drawing problems . . . is properly left to the trier of fact." *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 806 (Fed. Cir. 2007) ("[A] sound claim construction need not always purge every shred of ambiguity.") (citing *PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1355 (Fed. Cir. 1998) ("after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact")); see *Eon Corp. IP Holdings LLC v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1318–19 (Fed. Cir. 2016) (citing *Acumed* and *PPG*).

The Court therefore hereby construes "**situated around**" to mean "**include(s)**."<sup>12</sup>

---

<sup>12</sup> Because the parties have presented no further dispute as to the present disputed terms apart from the dispute as to "situated around," no further construction is necessary.

**G. “at least one . . . antenna element of . . . antenna array(s) . . . is repositioned to coincide with a nearest . . . antenna element of . . . antenna array(s)”**

<p><b>“at least one mono-band antenna element of one of the plurality of mono-band antenna arrays operating at a first working frequency band of the plurality of working frequency bands is repositioned to coincide with a nearest mono-band antenna element of another one of the plurality of mono-band antenna arrays operating at a second working frequency band of the plurality of working frequency bands”</b>  ('768 Patent, Claims 17, 31)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposal</b>
<p>No construction is necessary after “frequency band,” “repositioned” and “mono-band antenna element” are construed. If construction is needed, this term should be afforded its plain and ordinary meaning, “at least one [mono-band antenna element] of one of the plurality of mono-band antenna arrays operating at a first working [frequency band] of the plurality of working [frequency bands] is [repositioned] to coincide with a nearest [mono-band antenna element] of another one of the plurality of mono-band antenna arrays operating at a second working [frequency band] of the plurality of working [frequency bands].”</p>	<p>Indefinite</p>
<p><b>“at least one mono-band antenna element of one of the plurality of mono-band antenna arrays operating at said first working frequency band is repositioned to coincide with a nearest mono-band antenna element of another one of the plurality of mono-band antenna arrays operating at said second working frequency band”</b>  ('870 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposal</b>
<p>No construction is necessary after construction of “repositioned,” “frequency band,” and “monoband antenna array” (and “mono-band antenna array[”] may not even need construction). If construction is needed, this term should be afforded its plain and ordinary meaning, “at least one [mono-band antenna element] of one of the plurality of mono-band antenna arrays operating at a first working [frequency band] is [repositioned] to coincide with a nearest [mono-band antenna element] of another one of the plurality of mono-band antenna arrays operating at a second working [frequency band].”</p>	<p>Indefinite</p>

<p align="center"><b>“at least one first-band antenna element of the first antenna array is repositioned to coincide with a nearest second-band antenna element of the second antenna array”</b> (’256 Patent, Claim 11)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposal</b>
No construction is necessary after construction of “repositioned,” “frequency band,” and “monoband antenna array” (and “monoband antenna array[”] may not even need construction). If construction is needed, this term should be afforded its plain and ordinary meaning, “at least one first-band [antenna element] of the first antenna array is [repositioned] to coincide with a nearest second-band [antenna element] of the second antenna array.”	Indefinite

(Dkt. No. 132, Ex. B, at 37–39; Dkt. No. 238-1, Ex. A, at 28; *see id.* at 40.)

(1) The Parties’ Positions

Plaintiff argues that “a person of ordinary skill in the art would readily understand the scope of the claim terms with reasonable certainty, irrespective of whether Fractus’s or Defendants’ constructions are applied to the component phrases.” (Dkt. No. 183, at 23.)

Defendants respond that “[t]he claims reciting ‘is repositioned’ are . . . indefinite under *IPXL* for reciting both an apparatus and method steps” because “[i]t is unclear whether these claims are infringed when someone ‘repositions’ an element as required by the claims or, as Fractus alleges, when someone uses an antenna with one or more elements that have been allegedly ‘repositioned.’” (Dkt. No. 211, at 30 (citing *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed. Cir. 2005)).)

Plaintiff replies: “The limitation here is not a method or step, it is a description of the positioning of the multiband elements by reference to the positioning of elements in conventional monoband arrays. The language does not describe a step but rather a physical state: the element



‘is repositioned’ that is, it *is* in a different location, which describes the multiband element’s placement.” (Dkt. No. 218, at 8.)

(2) Analysis

“A single patent may include claims directed to one or more of the classes of patentable subject matter, but no single claim may cover more than one subject matter class.” *Microprocessor Enhancement Corp. v. Tex. Instruments Inc.*, 520 F.3d 1367, 1374 (Fed. Cir. 2008) (citing *IPXL Holdings*, 430 F.3d at 1384 (holding indefinite a claim covering both an apparatus and a method of using that apparatus)).

In all of the claims here at issue, the “is repositioned” limitation<sup>13</sup> relates to configuration of the claimed array rather than, for example, any user action. Defendants’ reliance on the *H-W Technology* case is therefore unpersuasive. *See H-W Tech., L.C. v. Overstock.com, Inc.*, 758 F.3d 1329, 1336 (Fed. Cir. 2014) (finding indefiniteness of “tangible computer readable medium” claims because of recitals that “said user completes a transaction” and “said user selects one of said variety of offers”). Defendants have also relied on the *Rembrandt* case, in which the claim at issue recited:

3. A data transmitting device for transmitting signals corresponding to an incoming stream of bits, comprising:  
first buffer means for partitioning said stream into frames of unequal number of bits and for separating the bits of each frame into a first group and a second group of bits;  
fractional encoding means for receiving the first group of bits of each frame and performing fractional encoding to generate a group of fractionally encoded bits;  
second buffer means for combining said second group of bits with said group of fractionally encoded bits to form frames of equal number of bits;  
trellis encoding means for trellis encoding the frames from said second buffer means; and  
*transmitting the trellis encoded frames.*

---

<sup>13</sup> The parties have agreed that “repositioned” means “moved to a different position.” (Dkt. No. 132, Ex. A, at 2.)

*Rembrandt Data Techs., LP v. AOL, LLC*, 641 F.3d 1331, 1339 (Fed. Cir. 2011) (emphasis added).

The claim at issue in *Rembrandt* thus recited a distinct method step. The phrase “is repositioned” in the claims at issue in the present case, by contrast, is recited in the context of the positions that make up the structure of the claimed antenna array. Defendants’ reliance on *Rembrandt* is therefore unpersuasive. Disclosures in the specification cited by Defendants similarly relate to how the relevant positions can be determined. *See* ’191 Patent at 3:39–42 & 6:66–7:25; *see also Microprocessor Enhancement*, 520 F.3d at 1375 (“apparatus claims are not necessarily indefinite for using functional language”).

The Court therefore hereby expressly rejects Defendants’ indefiniteness argument. No further construction is necessary. The Court accordingly hereby construes the disputed terms as set forth in the follow chart:

<u>Term</u>	<u>Construction</u>
<b>“at least one mono-band antenna element of one of the plurality of mono-band antenna arrays operating at a first working frequency band of the plurality of working frequency bands is repositioned to coincide with a nearest mono-band antenna element of another one of the plurality of mono-band antenna arrays operating at a second working frequency band of the plurality of working frequency bands”</b>  (’768 Patent, Claims 17, 31)	<b>Plain meaning</b> (apart from the Court’s construction of constituent terms)

<p><b>“at least one mono-band antenna element of one of the plurality of mono-band antenna arrays operating at said first working frequency band is repositioned to coincide with a nearest mono-band antenna element of another one of the plurality of mono-band antenna arrays operating at said second working frequency band”</b></p> <p>(’870 Patent, Claim 1)</p>	<p><b>Plain meaning</b> (apart from the Court’s construction of constituent terms)</p>
<p><b>“at least one first-band antenna element of the first antenna array is repositioned to coincide with a nearest second-band antenna element of the second antenna array”</b></p> <p>(’256 Patent, Claim 11)</p>	<p><b>Plain meaning</b> (apart from the Court’s construction of constituent terms)</p>

**H. “radiation and impedance patterns that are [substantially] similar in a plurality of the plurality of working frequency bands”**

<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary. If construction is needed, this term should be afforded its plain and ordinary meaning, “radiation patterns and impedance that are [substantially] similar in plurality of the plurality of working frequency bands.”</p> <p>A “radiation pattern” is “a graphical representation of the radiation properties of an antenna.”</p> <p>“Impedance” is a “ratio between the voltage and currents at the antenna feeding point.”</p>	<p>Indefinite</p>

(Dkt. No. 132, Ex. B, at 39–41; Dkt. No. 183, at 23; Dkt. No. 238-1, Ex. A, at 15–16, 21–22 & 28–29.) The parties submit that this term appears in Claims 1, 9, 16, 23, 30, and 38 of the ’768 Patent and Claims 1, 11, 20, and 29 of the ’870 Patent. (Dkt. No. 132, Ex. B at 39–40.)

### (1) The Parties' Positions

Plaintiff submits that “impedance describes the matching of the antenna to the covered frequencies, and in the context of a multiband antenna the term ‘impedance pattern’ would be understood to refer to how the antenna is matched over those frequencies.” (Dkt. No. 183, at 24.) Plaintiff argues that “a person of ordinary skill in the art would also understand what it means to have ‘similar’ and ‘substantially similar’ radiation and impedance patterns by comparing the graphical representations.” (*Id.*, at 25.) More specifically, Plaintiff argues that “[a] person of ordinary skill in the art and knowledgeable about the specific application of the antenna would be able to determine that patterns with slightly different gains, directivities, beam widths, side lobe levels, directions of maximum radiation, polarization, or number of side lobes would still be ‘similar’ if the operation of the antenna remained functional.” (*Id.*)

Defendants respond that “‘impedance pattern’ is a coined term without a definition in the specification,” “there is no guidance provided as to what makes one impedance pattern ‘similar’ or ‘substantially similar’ to another,” and “there is no guidance as to the kind of ‘radiation pattern’ contemplated by the patents.” (Dkt. No. 211, at 23.)

Plaintiff replies that “[a] person of ordinary skill in the art would understand that ‘similar’ and ‘substantially similar’ in context mean that the radiation patterns and impedance patterns are sufficiently similar to provide operation the relevant frequency bands [*sic*].” (Dkt. No. 218, at 9.)

### (2) Analysis

Claim 1 of the ’768 Patent, for example, recites (emphasis added):

1. An interlaced multiband antenna array comprising:
  - a plurality of antenna elements;
  - wherein the interlaced multiband antenna array is operative simultaneously on a plurality of working frequency bands;
  - wherein positions of the plurality of antenna elements result from juxtaposition of a plurality of mono-band antenna arrays, each mono-band antenna

array of the plurality of mono-band antenna arrays comprises a plurality of mono-band antenna elements;

wherein a number of the plurality of mono-band antenna arrays corresponds to a number of the plurality of working frequency bands of the interlaced multiband antenna array;

wherein the interlaced multiband antenna array employs a single multiband antenna element in positions where mono-band antenna elements of a plurality of the plurality of mono-band antenna arrays come together;

wherein the single multiband antenna element comprises a plurality of electromagnetically-coupled portions which are adapted to interact with each other to establish radio-electric characteristics of the single multiband antenna element with respect to *radiation and impedance patterns that are similar in a plurality of the plurality of working frequency bands*; and

wherein a spacing between the mono-band antenna elements of each mono-band antenna array of the plurality of mono-band antenna arrays is between a half-wavelength and less than one wavelength of the working frequency band corresponding to the mono-band antenna array.

Claim 1 of the '870 Patent recites, in relevant part (emphasis added): “radiation and impedance patterns that are *substantially* similar in a plurality of the plurality of working frequency bands.”

As a threshold matter, multiple authorities support finding that “substantially” is reasonably clear in context such as used here, and Defendants have not shown otherwise:

Expressions such as “substantially” are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to “particularly point out and distinctly claim” the invention, 35 U.S.C. § 112, and indeed may be necessary in order to provide the inventor with the benefit of his invention. \* \* \*

It is well established that when the term “substantially” serves reasonably to describe the subject matter so that its scope would be understood by persons in the field of the invention, and to distinguish the claimed subject matter from the prior art, it is not indefinite. Understanding of this scope may be derived from extrinsic evidence without rendering the claim invalid.

*Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116, 1120 (Fed. Cir. 2002); *see Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1983) (“substantially equal to” found not indefinite); *see also Anchor Wall Sys, Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d

1298, 1310–11 (Fed. Cir. 2003) (“[W]ords of approximation, such as ‘generally’ and ‘substantially,’ are descriptive terms commonly used in patent claims to avoid a strict numerical boundary to the specified parameter.”) (citations and internal quotation marks omitted); *Deere*, 703 F.3d at 1359 (“This court has repeatedly confirmed that relative terms such as ‘substantially’ do not render patent claims so unclear as to prevent a person of skill in the art from ascertaining the scope of the claim. . . . ‘The criticized words [“approach each other,” “close to,” “substantially equal,” and “closely approximate”] are ubiquitous in patent claims.”) (quoting *Andrew Corp. v. Gabriel Elecs. Inc.*, 847 F.2d 819, 821 (Fed. Cir. 1988)) (brackets in original); *Ecolab, Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1367 (Fed. Cir. 2001) (as to the term “substantially uniform”: “We note that like the term ‘about,’ the term ‘substantially’ is a descriptive term commonly used in patent claims to avoid a strict numerical boundary to the specified parameter.”) (citations and internal quotation marks omitted); *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332–36 (Fed. Cir. 2010) (“not interfering substantially” did not render claim indefinite); *Tinnus Enters., LLC v. Telebrands Corp.*, 846 F.3d 1190, 1205–06 (Fed. Cir. 2017) (under plain error review, applying *Nautilus* and affirming finding that “substantially filled” was not indefinite); *Exmark Mfg. Co. v. Briggs & Stratton Power Prods. Grp., LLC*, 879 F.3d 1332, 1344–47 (Fed. Cir. 2018) (“substantially straight” found not indefinite).

Defendants argue that the claims are unclear as to how “similar” and “substantially similar” are different. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1369 (Fed. Cir. 2007) (“[D]ifferent words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope.”). In light of the authorities set forth above, the meaning of “substantially” is readily understandable.

Defendants also argue that “similar” is indefinite as a term of degree that lacks sufficient support. *See, e.g., Datamize*, 417 F.3d at 1351 (“When a word of degree is used the district court must determine whether the patent’s specification provides some standard for measuring that degree.”) (citation and internal quotation marks omitted). Defendants have cited *ACQIS LLC v. Alcatel-Lucent USA Inc.*, in which the Court found indefinite the term “similar in design.” No. 6:13-CV-638, 2015 WL 1737853, at \*9–\*10 (E.D. Tex. Apr. 13, 2015). In *ACQIS*, the Court noted that “the only base reference for similarity is actually ‘identity.’” *Id.*, at \*10.

In the present case, by contrast, the usage of “similar” is reasonably clear in light of the specification. *See Seattle Box*, 731 F.2d at 826 (Fed. Cir. 1984) (“The trial court found here that an expert would know the limitations of the claims. The specification clearly sets forth, for example, that the divider blocks are intended to absorb the weight of overhead loads.”); *see also Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1382–83 (Fed. Cir. 2015) (relying in part on an understanding, in light of the specification, of what would be “feasible”). In particular, the specification discloses that in prior art antenna arrays it was “particularly difficult that the same array work simultaneously at another higher frequency.” ’191 Patent at 2:4–6.

The specification thus frames the multiband nature of the claimed invention in terms of operability, and the term “similar” is reasonably clear in this context. *See id.* at 5:11–15 (“the solution proposed in this invention rests in the use of a multiband antenna (for example of the fractal, multi-triangular, multi-level, etc. type) which covers all the frequencies associated with its position”), 5:46–53 (“Antennas with fractal geometry, multi-triangular antennas, multi-level antennas even stacked patch antennas are some examples of antennas *capable of working in like manner in multiple frequency bands.*”) (emphasis added), 7:43–67 (“simultaneous operation in both bands via a single multiband element”) & 10:5–19. Plaintiff’s expert likewise persuasively

explains that “[a] person of ordinary skill in the art and knowledgeable about the specific application of the antenna would be able to determine that patterns with slightly different gains, directivities, beam widths, side lobe levels, directions of maximum radiation, polarization, or number of side lobes would still be ‘similar’ if the operation of the antenna remained functional.” (Dkt. No. 183-1, Feb. 13, 2019 Long Decl., at ¶ 22.)

Defendants argue that Plaintiff’s interpretation renders other claim language superfluous, namely the separate limitation that “the interlaced multiband antenna array is operative simultaneously on a plurality of working frequency bands.” As a general matter, “claims are interpreted with an eye toward giving effect to all terms in the claim.” *Bicon*, 441 F.3d at 950. Here, whereas this separate limitation pertains to the “array,” the disputed term refers to “the single multiband antenna element.” Thus, no redundancy is apparent.

The remaining issue, then, is whether the phrase “radiation and impedance patterns” is reasonably clear. The specification explains that “radiation patterns” have been well-understood in the art:

Antenna array theory goes back to the works of Shelkunoff (S. A. Schellkunhoff [sic], “A Mathematical Theory of Linear Arrays,” Bell System Technical Journal, 22,80), among other classic treatises on antenna theory. Said theory establishes the basic design rules for shaping the radiation properties of the array (principally its *radiation pattern*), though its application is restricted mainly to the case of mono-band arrays.

’191 Patent at 1:56–63 (emphasis added). Plaintiff’s expert opines that “A ‘radiation pattern’ is a graphical representation of the spatial radiation properties of an antenna as a function of angle.” (Dkt. No. 183-1, Feb. 13, 2019 Long Decl., at ¶ 17.) The opinions of Defendants’ expert to the contrary, such as that a radiation pattern can plot any one or more of “power flux density, radiation intensity, directivity, phase, polarization, and field strength,” are unpersuasive because these and related opinions themselves evince an understanding of “radiation patterns.” (Dkt. No. 211, Ex.



6, Jan. 14, 2019 Ali Decl., at ¶ 40; *see id.* at ¶¶ 36–46.) Absence of implementation-specific details regarding the radiation patterns does not give rise to indefiniteness. *See, e.g., PPG Indus.*, 156 F.3d at 1355 (“after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact”); *cf. Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986).

As to “impedance patterns,” the parties agree that “impedance” is a well-known concept in the art of antennas. (*See, e.g.,* Dkt. No. 211, Ex. 6, Jan. 14, 2019 Ali Decl., at ¶¶ 33–34 (“[t]he ‘impedance’ of an antenna is ‘the ratio of the voltage to current at a pair of terminals or the ratio of the appropriate components of the electric to magnetic fields at a point’”).) The meaning of “impedance patterns” is reasonably clear in the context of the specification, which refers to maintaining consistent impedance behavior in multiple frequency bands. *See* ’191 Patent at 2:33–39 (“A multiband antenna is understood to be an antenna formed by a set of elements coupled to each other electromagnetically which interact with each other in order to establish the radio-electric behaviour of the antenna, behaviour which with respect to radiation and impedance patterns is similar in multiple frequency bands (hence the name multiband antenna).”); *see also id.* at 2:19–23 (“Although said [prior art] antennas are capable of maintaining a same radiation and impedance pattern over a broad range of frequencies, their application in practice is restricted to some concrete cases due to their limitations regarding gain and size.”). The opinions of Plaintiff’s expert provide additional support for this finding. (*See* Dkt. No. 183-1, Feb. 13, 2019 Long Decl., at ¶ 19 (“[I]t would be apparent to a person of ordinary skill in the art that ‘impedance pattern’ in the context of the interlaced patents is the impedance at different frequencies.”); *see also id.* at ¶¶ 20–21.)

Thus, the present disputed term is not analogous to the “subjective” term “unobtrusive manner” found indefinite in *Interval Licensing*. See 766 F.3d at 1371–74. Instead, the claim language at issue “inform[s] those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus*, 572 U.S. 910.

The Court therefore hereby expressly rejects Defendants’ indefiniteness arguments, and no further construction is necessary. See *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) (“Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.”); see also *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (“[D]istrict courts are not (and should not be) required to construe every limitation present in a patent’s asserted claims.”); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) (“Unlike *O2 Micro*, where the court failed to resolve the parties’ quarrel, the district court rejected Defendants’ construction.”); *ActiveVideo Networks, Inc. v. Verizon Commcn’s, Inc.*, 694 F.3d 1312, 1326 (Fed. Cir. 2012); *Summit 6, LLC v. Samsung Elecs. Co., Ltd.*, 802 F.3d 1283, 1291 (Fed. Cir. 2015).

The Court accordingly hereby construes **“radiation and impedance patterns that are [. . .] similar in a plurality of the plurality of working frequency bands”** to have its **plain meaning**.

**I. antenna array “employing a . . . multiband antenna in those positions of the [array] in which the positions of two or more elements . . . come together”**

<p><b>“multiband antenna array employing a single multiband antenna in those positions of the multiband antenna array in which the positions of two or more elements of the mono-band arrays come together”</b> ( ‘191 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary after “multiband antenna element,” “mono-band antenna elements,” and “come together” are construed.</p> <p>If construction is needed, this term should be afforded its plain and ordinary meaning, “the multiband antenna array employing a single [multiband antenna element] in those positions where two or more [mono-band antenna elements] of mono-band antenna arrays [come together].”</p>	<p>“single multiband antenna element of the multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”</p>
<p><b>“interlaced multiband antenna array employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together”</b> ( ‘918 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary after “multiband antenna element,” “mono-band antenna elements,” and “come together” are construed.</p> <p>If construction is needed, this term should be afforded its plain and ordinary meaning, “the multiband antenna array employing a single [multiband antenna element] in those positions where two or more [mono-band antenna elements] of mono-band antenna arrays [come together].”</p>	<p>“single multiband antenna element of the interlaced multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”</p>

<p align="center"><b>“interlaced multiband antenna array employs a single multiband antenna element in positions where mono-band antenna elements of a plurality of the plurality of mono-band antenna arrays come together”</b>  ('768 Patent, Claims 1, 9, 16, 23, 30, 38; '870 Patent, Claims 1, 11, 20)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary after “multiband antenna element,” “mono-band antenna elements,” and “come together” are construed. If construction is needed, this term should be afforded its plain and ordinary meaning, “the interlaced multiband antenna array employs a single [multiband antenna element] in positions where [mono-band antenna elements] of a plurality of the plurality of mono-band antenna arrays come together.”</p>	<p>“single multiband antenna element of the interlaced multiband antenna array replaces two or more mono-band antenna elements at those positions where the two or more mono-band antenna elements coincide in the same physical location”</p>
<p align="center"><b>“interlaced multiband antenna array employs a single multiband antenna element in positions where said first-band antenna element and said second-band antenna element come together”</b>  ('256 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary after “multiband antenna element,” “antenna element,” and “come together” are construed.</p> <p>If construction is needed, this term should be afforded its plain and ordinary meaning, “the interlaced multiband antenna array employs a single [multiband antenna element] in positions where said first-band [antenna element] and said second-band [antenna element] [come together].”</p>	<p>“single multiband antenna element of the interlaced multiband antenna array replaces said first-band antenna element and said second-band antenna element in those positions where said first-band antenna element and said second-band antenna element coincide in the same physical location”</p>

<p><b>“the interlaced multiband antenna array employs a single multiband antenna element in positions where at least two of said first-band antenna element, said second-band antenna element and said third-band antenna element come together”</b> (’256 Patent, Claim 17)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary after “multiband antenna element,” “antenna element,” and “come together” are construed.</p> <p>If construction is needed, this term should be afforded its plain and ordinary meaning, “the interlaced multiband antenna array employs a single [multiband antenna element] in positions where at least two of said first-band [antenna element], said second-band [antenna element] and said third-band [antenna element] [come together].”</p>	<p>“single multiband antenna element of the interlaced multiband antenna array replaces at least two of said first-band antenna elements, said second-band antenna element and said third-band antenna element in those positions where at least two of said first-band antenna elements, said second-band antenna element and said third-band antenna element coincide in the same physical location”</p>
<p><b>“the interlaced dual-polarized multiband antenna array employs a single dual-polarized multiband antenna element in positions where dual-polarized mono-band antenna elements of a plurality of the plurality of dual-polarized mono-band antenna arrays come together”</b> (’870 Patent, Claim 29)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
<p>No construction is necessary for this term after construction of “multiband antenna element,” “antenna element,” and “come together.” If construction is needed, this term should be afforded its plain and ordinary meaning, “the interlaced dual-polarized multiband antenna array employs a single [multiband antenna element] in positions wherein a plurality of mono-band antenna arrays [come together].”</p>	<p>“single dual-polarized multiband antenna element of the dual-polarized interlaced multiband antenna array replaces two or more dual-polarized mono-band antenna elements at those positions where the two or more dual-polarized mono-band antenna elements coincide in the same physical location”</p>

<p><b>“the interlaced multiband antenna array employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together”</b> (’918 Patent, Claim 1)</p>	
<b>Plaintiff’s Proposed Construction</b>	<b>Defendants’ Proposed Construction</b>
No construction is necessary for this term after construction of “multiband antenna element,” “mono-band antenna element,” and “come together.” If construction is needed, this term should be afforded its plain and ordinary meaning, “the interlaced multiband antenna array employs a single [multiband antenna element] in positions wherein a plurality of mono-band antenna arrays [come together].”	“single interlaced multiband antenna element of the multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”

(Dkt. No. 132, Ex. B, at 21–27; Dkt. No. 238-1, Ex. A, at 4, 9, 16–17, 22–23, 29, 36 & 42–43.)

#### (1) The Parties’ Positions

Plaintiff argues that “[o]nce the subsidiary terms are construed, the plain and ordinary meaning of these terms is clear.” (Dkt. No. 183, at 26–27.)

Defendants respond that “‘employing’ a multiband antenna element must be construed to require that a single multiband antenna element *replaces* two or more mono-band elements of the mono-band arrays at the coincident locations,” and “[t]he specification and figures repeatedly and unequivocally make this point.” (Dkt. No. 211, at 20.) Defendants also cite statements during prosecution of a foreign counterpart patent application. (*Id.*, at 21–22.)

Plaintiff replies that “Defendants’ proposal to substitute ‘replacing’ for ‘employing’ is unnecessary, requires an awkward rewriting of the entire claim language, and imports into the term a meaning it does not have.” (Dkt. No. 218, at 10.)

#### (2) Analysis

Claim 1 of the ’918 Patent, for example, recites (emphasis added):

1. An interlaced multiband antenna array having a plurality of antenna elements, wherein the multiband antenna array works simultaneously on a plurality of frequencies,

the multiband antenna array being characterised in that the position of the elements in the array results from the juxtaposition of a plurality of mono-band arrays, wherein the number of mono-band arrays corresponds to the number of working frequencies of the multiband antenna array,

the multiband antenna array *employing a single multiband antenna in those positions of the multiband antenna array in which the positions of two or more elements of the mono-band arrays come together*, wherein the single multiband antenna covers at least two working frequencies of the multiband antenna array.

The parties agree that “come together” should be construed as “coincide in the same physical location.” (Dkt. No. 132, Ex. A, at 2.)

Also, Defendants have submitted that the word “plurality,” which appears in some of the disputed terms, means “two or more,” and Plaintiff has not challenged Defendants’ interpretation. (See Dkt. No. 211, at 22; *see also* Dkt. No. 218, at 10; *Dayco Prods., Inc. v. Total Containment, Inc.*, 258 F.3d 1317, 1327–28 (Fed. Cir. 2001) (“In accordance with standard dictionary definitions, we have held that ‘plurality,’ when used in a claim, refers to two or more items, absent some indication to the contrary.”).) Because no dispute is apparent as to the meaning of “plurality,” no construction is necessary in this regard. *See U.S. Surgical*, 103 F.3d at 1568.

As to what appears to be in dispute, Plaintiff’s proposed interpretation would potentially allow for monoband antennas to be present at a particular position together with a multiband antenna. These disputed terms, fairly read, require that at least one position is occupied by a multiband antenna *instead* of two or more monoband antennas.

This is Defendants’ interpretation, which is also consistent with disclosures regarding using a multiband antenna instead of multiple mono-band antennas. *See* ’191 Patent at 7:17–19 (“the two or more coincident elements in the new position are *replaced* with a multiband element”) (emphasis added); *see also id.* at 2:66–3:3 (“In those positions in which one or various elements

originating in the conventional mono-band arrays coincide, a single multiband antenna (element) shall be employed . . . .”); *id.* at 5:17–44 (“In FIG. (1.3) the disposition is shown of the elements in the MIA which is capable of working simultaneously on the frequencies  $f$  and  $f/2$  conserving basically the same facilities as the two arrays (1.1) and (1.2). In the positions in which elements of the two conventional arrays (indicated in FIG. (1.3) by means of black circles located at the centre of a circumference) coincide, a multiband antenna is employed capable of working in the same manner (same impedance and pattern) on the frequencies (1.1) and (1.2).”).

The specification likewise explains the advantage of using fewer total antennas. *See id.* at 5:35–44 (regarding Figure 1, using “a smaller total number of elements (12 instead of 16)”), 5:66–6:7 (regarding Figure 2, “employing only 13 elements instead of the 21 required in the total of the three mono-band arrays”), 6:35–39 (regarding Figure 3, “employing only 12 elements instead of the 21 required in the total of the three mono-band arrays”), 6:51–57 (regarding Figure 4, “employing only 15 elements instead of the 24 required in the total of the three mono-band arrays”) & 7:62–67 (“simultaneous operation in both bands via a single multiband element . . . in such positions of the array (those positions at which those of the original mono-band arrays coincide), is one of the main characteristic features of the MIA invention”).<sup>14</sup>

The Court therefore hereby construes the disputed terms as set forth in the following chart:

---

<sup>14</sup> Defendants have also submitted European patent proceedings involving Plaintiff. Upon review, these statements made on behalf of Plaintiff in foreign proceedings do not significantly affect the Court’s analysis in the present case. (*See* Dkt. No. 211, Ex. 27, Oct. 11, 2012 Letter, at 6–7 (“For example, claim 1 of the patent as granted includes the feature in its characterizing part that ‘a single multiband antenna, capable of covering the different working frequencies, *is provided* in those positions of the array in which the positions of two or more elements of the mono-band arrays coincide’ (*emphasis added*). That is, a single multiband antenna *replaces*, or is used instead of, many elements of the mono-band arrays . . . .”); *see also id.*, Ex. 28, Nov. 20, 2006 Letter, at 3 (arguing that a reference “does not disclose a single multiband antenna . . . capable of replacing two or more mono-band elements”).)



<u>Term</u>	<u>Construction</u>
<p><b>“multiband antenna array employing a single multiband antenna in those positions of the multiband antenna array in which the positions of two or more elements of the mono-band arrays come together”</b></p> <p>(’191 Patent, Claim 1)</p>	<p><b>“single multiband antenna element of the multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”</b></p>
<p><b>“interlaced multiband antenna array employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together”</b></p> <p>(’918 Patent, Claim 1)</p>	<p><b>“single multiband antenna element of the interlaced multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”</b></p>
<p><b>“interlaced multiband antenna array employs a single multiband antenna element in positions where mono-band antenna elements of a plurality of the plurality of mono-band antenna arrays come together”</b></p> <p>(’768 Patent, Claims 1, 9, 16, 23, 30, 38; ’870 Patent, Claims 1, 11, 20)</p>	<p><b>“single multiband antenna element of the interlaced multiband antenna array replaces two or more mono-band antenna elements at those positions where the two or more mono-band antenna elements coincide in the same physical location”</b></p>
<p><b>“interlaced multiband antenna array employs a single multiband antenna element in positions where said first-band antenna element and said second-band antenna element come together”</b></p> <p>(’256 Patent, Claim 1)</p>	<p><b>“single multiband antenna element of the interlaced multiband antenna array replaces said first-band antenna element and said second-band antenna element in those positions where said first-band antenna element and said second-band antenna element coincide in the same physical location”</b></p>

<p><b>“the interlaced multiband antenna array employs a single multiband antenna element in positions where at least two of said first-band antenna element, said second-band antenna element and said third-band antenna element come together”</b></p> <p>(’256 Patent, Claim 17)</p>	<p><b>“single multiband antenna element of the interlaced multiband antenna array replaces at least two of said first-band antenna element, said second-band antenna element and said third-band antenna element in those positions where at least two of said first-band antenna element, said second-band antenna element and said third-band antenna element coincide in the same physical location”</b></p>
<p><b>“the interlaced dual-polarized multiband antenna array employs a single dual-polarized multiband antenna element in positions where dual-polarized mono-band antenna elements of a plurality of the plurality of dual-polarized mono-band antenna arrays come together”</b></p> <p>(’870 Patent, Claim 29)</p>	<p><b>“single dual-polarized multiband antenna element of the dual-polarized interlaced multiband antenna array replaces two or more dual-polarized mono-band antenna elements at those positions where the two or more dual-polarized mono-band antenna elements coincide in the same physical location”</b></p>
<p><b>“the interlaced multiband antenna array employs a single multiband antenna element in positions wherein a plurality of antenna elements of the mono-band antenna arrays come together”</b></p> <p>(’918 Patent, Claim 1)</p>	<p><b>“single interlaced multiband antenna element of the multiband antenna array replaces two or more elements of the mono-band arrays at those positions where the two or more elements of the mono-band arrays coincide in the same physical location”</b></p>

## V. DISPUTED TERMS IN THE SLIM TRIPLE BAND PATENTS

The parties had presented the following disputed terms as to the Slim Triple Band Patents:

- (1) “frequency band”; (2) “radiating element”; (3) “wherein some radiating elements from the first [second] set of the radiating elements operating at only said first [second] frequency band”; and (4) “substantially aligned” and “substantially vertical direction of the ground plane.” (*See* Dkt. No. 183, at 27–30.)


Because Plaintiff no longer asserts the Slim Triple Band Patents (*see* Dkt. No. 217, at 2), the Court does not address these terms in the Slim Triple Band Patents.

## VI. CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patents-in-suit, and in reaching conclusions the Court has considered extrinsic evidence. The Court's constructions thus include subsidiary findings of fact based upon the extrinsic evidence presented by the parties in these claim construction proceedings. *See Teva*, 135 S. Ct. at 841.

The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

**So ORDERED and SIGNED this 16th day of April, 2019.**

  
\_\_\_\_\_  
RODNEY GILSTRAP  
UNITED STATES DISTRICT JUDGE